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Teens r(h)apsody

Rap & Sing Music Therapy
for enhancement of emotion regulation in a school setting

Sylka Uhlig

VRIJE UNIVERSITEIT

Teens R(h)apsody
Rap & Sing Music Therapy for enhancement of emotion regulation in a school setting

ACADEMISCH PROEFSCHRIFT

ter verkrijging van de graad Doctor aan
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ten overstaan van de promotiecommissie
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Note. Rap quotes provided in this dissertation are from the adolescents in our performed Rap&SingMT study and translated by Shannon Gardner from the original Dutch lyrics into an American rhyming style. Additional Rap-quotes are from professional rappers and marked by an hash (#).

Preamble – a case study

Richard,[1] an East New York boy in a special education setting in Brooklyn, was the cause of regular conflicts at his school. This 11-year-old underweight African-American suffered from developmental delays, had average speech skills, erratic concentration and poor academic skills, and was often extremely violent with frequent severe mood changes, street-smart behaviour and bad language. Simple conflicts suddenly escalated into tantrums; he would yell, scream and curse, hitting everything and everybody around him. Richard's home environment was neither interested nor involved in his education, and his mother had never visited his school. After many of Richard's outbursts he was referred to individual music therapy, and I worked with him for two years.

By focusing on his special needs I first discovered his musicality when he was spontaneously engaged in vocally transforming parts of his aggression into rap: experimenting with shouting sounds and screaming words. While vocalizing, his speech-like articulations seemed to gradually release his tension when I matched and structured his rhythmic patterns. When Richard was in the *flow* – rapping about his deep frustration and anger, putting screaming sounds and words into a rhythmic pattern – I offered him support to contain his sounds as he would freely express himself as follows:

(SHOUTING SOUNDS)
YEAH, WOW ...
ASSHOLE, BITCH, I AM A NIGGER,
I HATE YOU,
BE CAREFUL,
NOBODY CAN TOUCH ME,
YEAH, YEAH,
STAY AWAY, F...ING ASSHOLE,
DON'T F... WITH ME,
I AM STRONG,
YEAH, YEAH, YEAH
DON'T MESS WITH ME,
BE CAREFUL,
YOU DON'T KNOW ME,
WOW, YEAH, YEAH...
(SHOUTING SOUNDS)

[1] Excerpts taken from case description of Richard in Uhlig (2011a).

During the second year of music therapy, besides his aggressive raps Richard had also started to create different music. When he verbally expressed himself, I always tried to be vocally and musically supportive and to contain his manifestations, whether calmer or more aggressive. I uttered sounds, sang and rapped to him, mirrored and provoked him or invited more of his personal articulations. Suddenly, he developed a sense of *vocal dialogue* with me during our raps, a responsiveness to special subjects as well as to my personal presence. We improvised intensely together using non-verbal and verbal sounds, creating solos and refrains, and singing call and response patterns. Rhythmically shouting and expressing what he needed to say seemed to be a release for his aggression. While in dialogue with him, answering his sounds and functioning as a resonator seemed to establish a beginning reflection of himself. After more than a year he developed a different attitude and created touching songs, for instance a blues especially for his own classmates. Instead of hate and anger he sang about love:

We are happy
Love is happiness from the bottom of my heart
God loves us from his heart
We know we are a happy family
The kids run around with me.
Love is happy[ness] with my heart
From class [...] love is happy[ness] with my heart
To the kids from my heart
I love when the kids play with each other
When I am home the kids play with me
The kids like to be happy

Gradually, Richard had begun to relax – he seemed to have experienced safety, being heard and feeling understood. He developed a sense of himself and of others as he exposed a totally different side of his personality. Asking me for help with spelling for his developing song lyrics, he carried over his curiosity for learning into the classroom. During the performance of his blues on the school stage, watched by his mother – who was visiting her son's school for the first time – his personal transformation from violent rap into lovely blues shifted not only on a musical level, but everybody shared their tears and appreciation for his touching song.

Chapter 1

General Introduction

Adolescence

Adolescence, the developmental period in human life with a remarkable neurological plasticity and adaptability to emotional, social, physical, sexual and intellectual challenges, as described by Lee and colleagues (2014), is 'characterized by heightened emotional reactivity, sensitivity to peer influences, impulsivity, and novelty seeking, with a seemingly limited capacity to engage self-control to override these emotions and actions'. During this important period the risk for onset or chronicity of mental disorders urges early interventions, investing in quality of life, and limiting social difficulties as well as economic costs (Lee et al., 2014; Kessler et al., 2010). According to the World Health Organization (WHO, 2016), from the 1.2 billion adolescents in the world aged 10 to 19, one in four to six demonstrate mental health problems, depending on country income levels and life conditions (Kessler et al., 2010; Merikangas et al., 2010). The leading global mental problem of young people is depression, and suicide is the third cause of death. These dramatic facts are only surpassed by traffic accidents as well as the 180 adolescents who die every day as a result of interpersonal violence (WHO, 2016). Worldwide, the enormous costs for mental health are the highest single source of global economic burden (Lee et al., 2014), and their cumulative global impact of lost economic output between 2011 and 2030 is estimated at US$ 16.3 million (WHO, 2013)[2]. To illustrate, the costs for adolescents who were seriously antisocial in childhood were 10 times greater than for those who exposed problems later in life (Lee et al., 2014; Scott, Knapp, Henderson, & Maughan, 2001).

It has become internationally accepted that there is no adequate response yet to those mental health needs and burdens, and that a large gap between the necessity for intervention and treatment and its provision exists (WHO, 2013). Programmes such as 'Making Every School a Health Promoting School' by 2023 (WHO, 2018) and early interventions have to support child and adolescent mental health by offering prevalence, longitudinal studies, high-quality clinical trials, and adequate government policy and funding. Trained clinicians are needed to reduce mental health problems, like antisocial behaviour in childhood, which could result in cost savings later on (Kessler et al., 2010). Generally, early intervention and preventive programmes have been shown to correlate to well-being and a reduction in psychopathology in adolescence, positively affecting self-regulation of emotions and coping capacities, as well as limiting stress and sleep disturbances (Brand et al., 2015; Van Schalwijk, Blessinga, Willemen, Van der Werf, & Schuengel, 2015). Those programmes support academic achievement of troubled mental health students in school (Suldo, Thalji, & Ferron, 2011), prevent acute and chronic adult mental health problems (Maslowsky & Ozer, 2014; WHO, 2016), and improve personal well-being and productivity later in life (Kessler et al., 2010)[3].

In this thesis we focus on the mental health needs of adolescents in a regular school environment, e.g. their emotional, cognitive and social capacities and their personal and peer reactivity, in relation to how a music intervention may contribute to their well-being. Our intention included a preliminary investigation to address and possibly limit the risk of developing mental problems in a regular school environment.

School interventions

Preventive school interventions for adolescents are designed to improve well-being, encourage emotional intelligence and influence cognition (Inchley et al., 2016; International Coordinating Centre Child & Adolescent Health Research Unit, HBSC (n.d.)). The preventive programmes can support various components, such as early identification of emotional problems (HBSC) by addressing individual risk factors like depression, as well as increasing connectedness within the school environment and community feelings by focusing on strong bonding strategies (Shochet, Dadds, Ham, & Montague, 2006). These components (e.g. encouraging emotional knowledge) must be integrated into positive school engagement strategies and should enhance the development of self-regulated behaviour (Hofmann, Schmeichel, & Baddeley, 2012; Mitchell & Phillips, 2007), change negative attitudes and suicidal thoughts (Strunk, King, Vidourek, & Sorter, 2014), promote problem-solving and social skills-building (Inchley et al., 2016), and enhance the willingness to learn (Jones & Zigler, 2002). Adolescent adaptation to those key human skills requires their solid engagement during classroom sessions, which includes shared decision-making, a focus on rewarding effort rather than achievement and building strong relationships (Shochet, et al., 2006). Finally, to increase the self-efficacy of adolescents the entire school has to be included in that process for more than one year (Inchley et al., 2016; HBSC), as opposed to many short-term interventions that focus on single problems.

[2] U.S. health care spending reaches new peak: $10,345 per person (Alonso-Zaldivar, 2016). Also Dutch admissions for mental and behavioural disorders are higher than in other countries. Dutch health spending is second only to the US in the OECD (2016) (Bakx, O'Donnell, & Doorslaer, 2016).

[3] The relationship between developed childhood self-control skills and unemployment throughout the life span seems to be predictable (Daly, Delaney, Egan, & Baumeister, 2015).

Music Therapy

Music therapy offers comprehensive programmes for those required engagement strategies in schools – e.g. using music as a motivating intervention with a rewarding effort and therapeutic strategies to build nurturing relationships – by addressing difficult issues like negative behaviour and emotional problems (Tomlinson, Derrington, & Oldfield, 2011). Music therapy offers individual[4] and group treatment, and differentiated by the requirements of the population also carries preventive value (Nöcker-Ribaupierre & Wölfl, 2010; McFerran & Wölfl, 2015). Preventive music therapy projects in schools demonstrate that those music-therapeutic activities offer young people a platform to express their emotional states, regulate affect and aggression, and support resolution of conflict situations (Nöcker-Ribaupierre & Wölfl, 2010). The motivating use of music can structure adolescents' feelings and thoughts, facilitate dialogue with peers and adults, and address avoidance of and resistance to threatening situations in a constructive way (Krüger & Stige, 2015; Nöcker-Ribaupierre & Wölfl, 2010). By allowing them to communicate openly and to accept individual differences as well as dissimilar music preferences, this platform helps adolescents integrate socially (by working creatively on shared decision-making) and promote respect (Nöcker-Ribaupierre & Wölfl, 2010). Those pleasurable and stimulating activities with challenging discourses, e.g. about music styles (Rock, Rap, Pop), as well as the development of nurturing relationships during the music-therapeutic process aim to raise the psychosocial well-being of adolescents. These age-appropriate music therapy interventions are integrated and responsive to mental health, and placed in a community-based setting fulfil the requirements of desired mental health actions (WHO, 2012). However, they are generally not performed in schools – as yet.

Literature review

Music

Nowadays, the use of music as a mental health support strategy is still in its infancy. Growing research on the psychology of music indicates an increase in music consumption: roughly 18 hours of music-listening per person in an average week. American research shows that money spent on music increased too, by 1000% between 2004 and 2010 (Rentfrow, 2012) – a trend that reached a new milestone in 2018 with on-demand song streaming activity surpassing US$ 400 billion, 12.5% increase year over year.[5] Engagement in these musical activities involves cognitive processes related to attention, memory, categorization, motor action planning, expectation, communication and emotion (Levitin & Tirovolas, 2009). Recent studies demonstrate strong effects of music on emotional processes (Juslin, Liljeström, & Västfjäll, 2011; Koelsch, Siebel, & Fritz, 2011; Levitin & Tirovolas, 2009; Moore, 2013; Patel, 2008ab, 2010; Peretz, 2009; Schlaug, 2009; Thaut, 2013) and display the complex relationship between music engagement and well-being (Chin & Rickard, 2014). Regardless of some inconsistency in the used terms (Baltazar & Saarikallio, 2015, 2016), music research indicates that emotion regulation[6] is youth's primary motive for listening to music. Music has a strong influence on the development of adolescents, in particular regarding identity formation, socialization, emotion regulation and coping, personality and motivation, gender roles, and support for positive youth development (Miranda, 2012; Rentfrow, 2012; Saarikallio, 2008).

Despite this increase of studies on music and emotion regulation, identity development and social bonding, music seems not to have touched mainstream social-personality psychology yet (Rentfrow, 2012). We performed a systematic literature review which yielded that music has a 'self-regulative potential' and is viewed as a very individual and, according to some researchers, cross-culturally accepted therapeutic tool. The effects of music on emotionally-evoked processes are demonstrated, but music interventions for specific emotion regulation purposes (clinical and non-clinical) are restricted in their application (Uhlig, Jaschke, & Scherder, 2013). For instance, the intended use of music for regulation purposes by directly influencing participants has been demonstrated by a limited number of studies (Plener, Sukale, Ludolph, & Stegemann, 2010; Thoma, Scholz, Ehlert, & Nater, 2012b; Mennin, Heimberg, Turk, & Fresco, 2005; Punkanen, Eerola, & Erkkilä, 2011). Most research presents too few actively performed music interventions, and samples are typically taken from a population of university students with common backgrounds who are non-psychopathological, non-diagnosed and not categorized as healthy/unhealthy. Detailed multidimensional studies are required that need

[4] See excerpts of the Richard case description (Uhlig, 2011a, preamble)

[5] Nielsen Music US Year-End Report (2017-2018)

[6] Emotion-regulation related to music's capacity for self-regulation in our study, is based on the description of Moore (2013), who presents preliminary neurological evidence for the specific use of music listening, singing or improvising to facilitate emotional regulation in music therapy. The potential of music in regulating emotions occurs because, if sensory information is unthreatening, amygdala activity decreases. Mostly, music is unthreatening, but some clinical interventions involve therapeutic stimulation to maintain or increase amygdala activity. This in turn intensifies the emotional experience in response to pleasant and unpleasant sounds, which are crucial for the regulative process of behavioural change (Moore, 2013) (referred to in Uhlig et al., 2015).

to compare regular participants with and without psychopathology (e.g. in schools), include control groups and systematically measure the effects of applied music interventions instead of only assessing effects on personal mental health through online surveys (Uhlig et al., 2013). This research should be multidisciplinary in order to build bridges between researchers, educators and therapists. To fully understand the complex phenomenon of music, adequately focus on for example emotion regulation/dysregulation in clinical and non-clinical settings, and develop reliable measures, knowledge domains need to be linked (Aldao, 2013; Miranda, 2012; Rentfrow 2012; Rottenberg & Gross, 2007; Gratz & Roemer, 2004). The insights to be gained are yet to be revealed for the next challenge of designing and applying music-making and music-listening interventions, in order to assess the development of emotion regulation skills and health promotion in both clinical and non-clinical settings (Miranda, 2012; Plener et al., 2010; Miranda & Gaudreau, 2011; Saarikallio & Erkkilae, 2007; Mennin et al., 2005). Nevertheless, there is a need for a greater focus on these subjects, like developing a specific concept for music regulative purposes valid for clinical and non-clinical settings. Research needs to combine the evaluation of music effects with measurements of psychopathology such as early assessments of emotional symptoms and behavioural problems, preventively influencing regulation/dysregulation, and support for well-being in adolescence.[7]

Rap & Sing Music Therapy

The Rap & Sing Music Therapy (Rap&SingMT) intervention in this study is designed to stimulate regulative emotional processes as support for well-being and to develop skills for health promotion in adolescence. It is constructed around components of cognitive behavioural therapy and psycho-education, and based on three elements used in music: (1) rhythm, (2) vocal expression of singing and rapping, and (3) development of verbal expression, words and song lyrics (Uhlig, Jansen, & Scherder, 2015). Vocalizations, expressed through voices, present a broad diversity of expression and communication patterns and sounds; they are the key vehicles for human emotion and communication (Benninger, 2010; Heman-Ackah, 2009, p. 21), and employ the main concepts of this study. Related to biology, this natural vocal expression of emotions is associated with sensitive situations from the greatest joy to the deepest sorrow (Benninger, 2010; Juslin & Timmers, 2010). This human vocal potential developed from involuntary signals to linguistic and musical symbols into voluntary actions of speech (Elmer, 2011)[8]. Voices are seen as the most personal instruments of humans, while vocal sounds are used in all societies to define human attributes (Potter & Sorrell, 2012), to transcend cultures and generations (Peretz, 2009) and to designate those acoustic symbols to collective values (Uhlig, 2006, p. 41). *Vocal dialogues*, imitating and completing musical phrases (described in case study, preamble), offer shared moments of emotions, and this 'vocal musicality' is fundamental for humans and their healthy attachment ties, as it supports feelings of safety and trust for survival as well as cooperation (Koelsch et al., 2011; Stern, 2010; Malloch & Trevarthen, 2009; Mihten, 2005).

Singing,[9] a universal human activity (Potter & Sorrell, 2012), is the natural expression of primary utterances of vocal sounds or words, creating musical tones by means of the human voice. Furthermore, it is vital for humans to invoke or enhance well-being (Koopman, 1990). Singing is seen as an important step in the creation of language; it is built around a stable set of pitch intervals and allows the creation of a tonal centre (Patel, 2008a, p. 183). Rap,[10] in its earliest development, might have operated as vocal human expression in negro songs: composed unexpectedly, often unconsciously or instinctively made up by putting 'shouts' and words into a rhythm or rhyme, to transform vocalization into verbalization (Allen, Ware, & Garrison, 1992, p. ii). Descriptions of contemporary rap, originating from Jamaica, developed between the 1940s and the 1960s and adapted from black DJs' rhyming styles, are known since the 1970s. Using turntable and vinyl, the DJ rhymed to 'lyricize spontaneously about everything from love to the plight of Jamaican masses', and rap emerged out of New York City African-American popular music into the world (Pennycook, 2007; Perkins, 1996, p. 5). The value of rap, its subjects and its related cultural needs are regularly examined, as they challenge societies to seriously discuss historical, political and emancipatory connotations of rap music as a part of hip hop culture (Rebollo-Gil & Moras, 2012; Viega, 2013). Vocalizations of singing and rapping used in clinical settings of music therapy, commonly based on best-practice approaches, involve discussing those subjects and presenting an enhanced well-being of young people through the expression and modulation of their positive and negative emotions (Hadley & Yancy, 2012; McFerran, 2012; Short, 2013; Viega, 2013, 2015).

[7] As the newly developed *Tuned In* programme promises, a brief emotion regulation intervention using music-listening for adolescents in a school setting (Dingle, Hodges, & Kunde, 2016).

[8] Throughout human evolution, voices still carry an undiscovered potential of variabilities and sounds (there are around 7,000 languages worldwide) (Elmer, 2011).

[9] Singing: Middle English singen, Old English singan; cognate with Dutch zingen, German singen, Old Norse syngva, Gothic siggwan (Koopman, 1990).

[10] Rap, as speech-like, reciting or calling out, is one of the hip-hop styles today, also defined as Rhythm And Poetry, while various oppinions about its 'poetry' change over time and differ across cultures.

The aim of this study

Using rapping and singing as a motivational tool and early intervention, as in Rap&SingMT, aims to support the development of self-regulative skills in adolescence. This study developed and tested a protocol of Rap&SingMT as an age-appropriate music therapeutic intervention strategy in a school classroom setting. Aims of the intervention were: 1) to enhance well-being in adolescence, 2) to reduce adolescents' potential development of problem behaviours, and 3) to establish the power of music therapy in a non-clinical educational setting. The study was motivated by positive experiences with clinical cases (see example of Richard, preamble) in which rapping and singing in music therapy were methodically applied for purposes of emotional regulation and coping. This practice-based method is described in more detail by Uhlig (2011b) as a *pre-study*, and was adjusted to a group intervention for a regular school environment for the current research (see Appendix for original method). This application and assessment of the rapping and singing intervention as an emotional engagement strategy for non-clinical adolescents is the first of its kind so far. The current development and testing of the protocol of the Rap&SingMT as a randomized controlled non-clinical trial therefore aims to provide a valuable contribution to further professionalize the music therapy field.

Outline of the thesis

The main subjects of this thesis, the population of adolescents with their needs, as well as associated risk for and high costs of mental health problems underline the need for self-regulation tools. Our exemplary *at-risk case* Richard (Uhlig, 2011a, preamble) underscored his fierce demands in his notable narrative. His story functioned as a case example for the development of a preventive group school intervention for self-regulation, to investigate the effects of Rap&SingMT as a motivating mental health support strategy for adolescents with lesser demands. The research in this thesis mainly applies quantitative methods, supported by a mixture of qualitative assessments, as described in the upcoming chapters.

Chapter 2 presents results of a survey among music therapists on their clinical observations with youth concerning rapping and singing applications for the enhancement of self-regulative skills during the process of emotional and vocal expression, corroborating the theoretical and practical concepts of this study. **Chapter 3** presents the study protocol for a randomized controlled trial on the effects of the Rap&SingMT, including the key concepts of this study – rhythm, vocalization and verbalizations – as well as expectations about the rap-and-sing intervention. **Chapter 4** describes the results of the overall benefits of Rap&SingMT for the psychological well-being of adolescents in a school setting, operationalized as self-description, self-esteem and emotional regulation. **Chapter 5** presents the results of Rap&SingMT as a school-based intervention for adolescents in terms of its effects on measures of executive functions, i.e. inhibition, planning and working memory, as well as the outcomes of an added video micro-analysis. **Chapter 6** presents results of active engagement in Rap&SingMT as a school group intervention on well-being and sleep in adolescence. **Chapter 7** encompasses the general discussion with integrated reflections on the study and its results. The strengths and limitations of the study and the experiences about the performed intervention are discussed. Conclusions for non-clinical practice and implications for future research are provided.

Appendix chapter 1

Pre-study: Table Rap Music Therapy Method taken from ''Rap and Singing for the Emotional and Cognitive Development of At-risk Children: Development of a Method''. Uhlig, S. (2011b) In *Voicework in Music Therapy, Research and Practice*. Baker and Uhlig (Ed) Jessica Kingsley Publishers, GB.

Table 3.1. Uhlig's Rap Music Therapy Method

Step 1: Organization of assessment process and practical preparation
Therapist observes client, identifies needs, formulates assessment for music therapy
Therapist selects location for music therapy treatment where noise and music can be tolerated
Therapist organizes equipment which may include two microphones, equalizer, keyboard, loops, acoustic drumss
Therapist prepares recording device/s which will be used to record musical contributions during the sessions
Step 2: Initial treatment: process
Therapist presents the client with different rhythmic patterns, using programed rhythms from keyboard, loops or acoustic drums
Therapist observes the client's reactions and preferences for rhythms, tempo and dynamics
Therapist offers the client suggestions of some single vocal shouts, sounds or words into a rhythm, observing how the client reacts to these
Therapist & client search for and discuss whether the client has existing written lyrics or is willing to create lyrics
Step 3: Treatment process
Therapist offers the client rhythmic stimulation, develops simple patterns for the client using keyboard, loops or acoustic drums
Therapist utters vocal shouts, sounds or words, develops simple vocal patterns, using microphones
Therapist creates simple vocal patterns and invites the client to imitate what he/she has created; the therapist coordinates the sensory input and stimulates the client to create more sounds/words
Therapist & client fit existing (client) written lyrics into a rhythm; the therapist or the client rap alone or together
Therapist encourages and stabilizes the client, ensures that the rhythm continues by structuring vocal sounds, words, and patterns
Therapist maintains pattern, focus on predictability, keep repeating to coordinate the sensory input of client to entrain timing supporting homeostasis
Therapist synchronizes and repeats the rhythmic patterns of the client, adjusting to her/his tempo and dynamics, and aims to establish moments of entrainment
Therapist continuously follows the client's development and assesses if and when to interact with the client
Step 4: Intensifying treatment process
Therapist interacts with the client, carefully imitates his/her vocal sounds, and introduces a call-and-response technique to establish trust
Therapist increases the intensity of the dialogue with the client, repeats the client's vocal sounds, and answers the vocal expression of the client; fill-in-the-blank techniques are used; the therapist offers a temporal structure for entrainment
Therapist & client intensifying their interaction, singing melodic lines, which aim to effect changes to affect and mood; the therapist creates a container in which the client can feel a sense of safety and decreased anxiety
Therapist & client share their communication patterns, exchange of emotions and feelings, the client experiences emotional satisfaction when expressing/sharing pleasure, sadness or aggression
Therapist stimulates word recall and further supports language acquisition by rhyming more words, and creating lyrics/poems
Step 5: Therapy transition
Therapist & client enter the transition phase of therapy process, the therapist offers the client a recording or performance experience; they discuss the need for exposure of behavior change outside of therapy
Therapist transfer, preparing and training the client for transition from therapeutic process into therapeutic product (songs) and exposure of behavior change.
Therapist begins to step back from therapeutic process to facilitate transition, and provides the client with support
Therapist & client invite outsiders to share important client developments, the therapist creates safe environment for transition during performance or song recording

''You might take my life ...
But you can't take my soul!
You can't take my soul!
...
Refuse to be a product or brand,
I'm human
Refuse to contribute to the gangster
Illusion
Whether I'm number One,
Number two, or Number Three
I'm unique
and there will never be another me
and there never be another you
be proud of who you are,
don't copy what the others do
they are not superior,
you are not inferior
...
But every time I try to sleep
I hear the devil singing''#[11]

[11] Quote of professional rapper Lowkey - My Soul, https://www.youtube.com/watch?v=RgYVDdQJYXM

Chapter 2

Rap and singing are used by music therapists to enhance emotional self-regulation of youth: Results of a survey of music therapists in the Netherlands

Published:
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Abstract

The purpose of this study was to examine approaches of music therapists towards the application, frequency, and function of rap and sing engagements. Identification of these characteristics might support the refinement of these therapeutic interventions and encourage detailed application. A 25-question survey was sent to 336 qualified music therapists in the Netherlands. The questions sought information on such aspects as the role of rhythm in rapping and of melody in singing, the frequency of these applications in music therapy practice, and the treatment goals with reference to the needs of the clients. Results indicated that both rapping and singing applications in music therapy can enhance self- regulative skills during the process of emotional expression. In particular rapping occurred in this study considerably less frequent than singing but considered to decrease aggressive behavior. Singing was applied daily and associated with the support of deeper emotional involvement. The results suggest the need for more consistent descriptions of therapeutic interventions for the use of rap styles in music therapy practice, and the development of specialized protocols for research studying its effects for quality improvement.

Introduction

Young people have a preference for popular music, which plays an important role in their daily psychological functioning including an individual's behavior, and emotional, social and mental health (Laiho, 2004). Music is used as entertainment and for personal well-being but can also help to build personal and social identity (Laiho, 2004; Mulder et al., 2009). Further, musical preference can represent characteristics of the social-psychological functioning of people at young ages, as well as provide information about how they internalize and externalize problems (Mulder et al., 2009). Additionally, music can help youth to cope with certain problematic situations (Juslin & Laukka, 2004; Laiho, 2004; Saarikallio, 2008; Sloboda & O'Neill, 2001) and aid emotional self-regulation for health promotion (van Goethem & Sloboda, 2011; Mennin, Heimberg, Turk, & Fresco, 2005; Miranda, 2013; Rentfrow, 2012; Saarikallio, 2008). To modulate stress and to support emotion-specific activities, music can be applied as a therapeutic tool (Koelsch, 2015; Koelsch, Offermanns, & Franzke, 2010; Moore, 2013; Stegemann, 2013; Uhlig, Jaschke, & Scherder, 2013). Consequently, regulative therapeutic interventions using different styles of popular music, like hip-hop and rap, as a supportive medium in (school) counselling, are increasingly applied (Elligan, 2004; Gonzalez & Hayes, 2009; Hadley & Yancy, 2012; Travis, 2013; Tyson, 2002; Viega, 2013, 2015).

According to Elligan (2004), hip-hop and especially rap, grew primarily out of the interaction of poverty, music, dance, graffiti and fun, originally bridging cultural gaps, and developed into an important form of communication around the world. Studies about rap and hip-hop songs have shown that many works include socially negative themes in the lyrics, such as homophobia and misogyny (Cundiff, 2013). It has been claimed that popular rap/hip-hop music influences youth and their attitudes toward domestic violence (Cundiff, 2013). Some have judged rap as contributing to sexual aggressive behavior (Hoston, 2014). The media focus on themes of violence and misogyny have marginalized rap's political critiques, as well as highlighted tensions between musical and authorial identities (Oden, 2015). The close relationship between record companies and rap artists suggest controversial lyrics are profitable, and therefore creating such works is a response to community demand.

Responding to this demand, rap songs mainly consist of misogyny, violence, and homophobia. But numerous rappers also express authentic, empowering messages in their lyrics about grief, friends, community distress or imprisonment, exemplifying emotions of intimacy, loss or death (Oware, 2011).

While seeming to offer us an uncomfortable involvement in themes like gender, race, class, power, and privilege, working with rap and hip-hop in therapy also provides a funky discourse and cultural dialogue about these subjects (Viega, 2015). Also, linking music and culture with health, like the HIP HOP PSYCH (2014) project in Great Britian, provided by a psychiatrist and neuroscientist, aims to develop more awareness to empower hip-hop as therapy. Analysis of hip-hop or rap lyrics as a verbal psychotherapeutic intervention advocates for the motivational use of rap therapy for youth, (Elligan, 2004), as a means of identifying personal and social themes, improving insight into their lives and promoting positive behavior change by verbally discussing these, sometimes controversial, subjects.

At-risk youth population

This research focuses on youth and young adults (10–29 years old; WHO n.d.) in music therapy in clinical treatment as well as in special education settings, often classified as an at-risk population (National Centre for School Engagement, NCSE 2015; Sutton, 2011). Both youth in special education and treatment settings often show similar at-risk patterns, including antisocial behaviors (Bullis, Walker, & Sprague, 2001). Although not all youth in (music) therapy are eligible for this term, the definition of an at-risk population in this study indicates their risk for (future) mental health illnesses and their need for clinical treatment (Bullis et al., 2001; NCSE, 2015). Youth at-risk often lack social or emotional support, they are neglected at home, live in stressful environments, or are involved with delinquent peers. They might be mentally ill, have involvement in physical, emotional, or sexual abuse, or suffer from addiction problems and traumas, which contributes to being categorized as at-risk (Bullis et al., 2001; NCSE, 2015; Sutton, 2011; WHO (n.d.a)). Hamblen and Barnett (n.d.) estimated that the rates of post-traumatic stress disorder (PTSD) in at-risk children and adolescents varies from 3 to 100%. Van Dam, Nijhof, Scholte, and Veerman (2010) examined (forensic) treatment programs for youth (N = 514; mean age = 15) in the Netherlands. They reported equal backgrounds for the development of psychopathological behavior among at-risk youth, and revealed a high manifestation of (un)diagnosed mental health problems and trauma. In the United Kingdom, the International Coordinating Centre Child & Adolescent Health Research Unit, HBSC (n.d.)) has found that around 30% of English adolescents reported a poor level of emotional well-being (2009–2010). Around 10% of them have a mental health issue, whereas self-harm rates have increased sharply over the past decade and indicate a possible rise in mental health problems among young people (UK Parliament). Therefore, the diverse array of at-risk populations require specifically designed, refined and motivating approaches, particular in clinical treatment to develop self-regulative skills with attainable goals (NCSE, 2015).

Rapping and singing in music therapy

Music therapists incorporate psychotherapeutic principles into their treatment to motivate (often difficult-to-engage) youth and young adults, by the use of their preferred popular music. For example, rap and sing engagements are easily applied (no instruments are needed) to intensively partake in their personal and social identification process, and to improve behavior (Ahmadi & Oosthuizen, 2012; Donnenwerth, 2012; Ierardi & Jenkins, 2012; MacDonald & Viega, 2012; Lightstone, 2012; McFerran, 2012, Hadley & Yancy, 2012; Hakvoort, 2015; Travis, 2013; Viega, 2013, 2015; Uhlig, 2011). More specifically, music therapists document the precise application of music for youth in their studies, describing how they musically involve and support the act of emotional transformation, such as the expression of sadness or the transformation of anger (Baker & Jones, 2005; Choi, Lee, & Lee, 2008; Derrington & Philippa, 2011; Hadley & Yancy, 2012; McFerran, 2010; Rickson & Watkins, 2003; Short, 2013). In these reports the use of rap styles often take a central place as a bridge between talking and singing (Uhlig, 2011a). Music therapists intervene during the rhythmical vocalization of the rap of the client, through rhythm, tempo and other musical or vocal interjections, according to therapeutic goals (Hakvoort, 2015). Specifically rhythmical and melodic vocal work, like rapping and singing to express and articulate thoughts and feelings as well as to reduce stress or tension levels, might be efficient and effective, as several neurological studies about vocal music suggest (Callan et al., 2006; Leins, Spintge, & Thaut, 2009; Patel, 2011; Wan, Rüber, Hohmann, & Schlaug, 2010).

The use of rap styles as a motivating tool for (early) involvement in mental health challenges at a young age might be contraindicative because of (some) aggressive or uncomfortable use of music, lyrics and meanings (Cundiff, 2013; Hoston, 2014; McFerran, 2012; Oden, 2015; Oware, 2011; Short, 2013). On the contrary, by engaging in the preferred popular music and its implication on the psychological functioning of youth (HIP HOP PSYCH, 2014; Laiho, 2004; Mulder et al., 2009; Viega, 2015), rapping can help build personal and social identity as well as well-being by addressing these uncomfortable themes. The indicative use of rap styles can exhibit challenging behaviors and transform and regulate these emotional difficulties during the music therapy process (Hadley & Yancy, 2012; McFerran, 2012; Short, 2013; Viega, 2013).

Rhythm & melody

This study aims to identify key concepts of rapping and singing by exploring the role of rhythm and speech (rhyming words) as well as melody and singing in music therapy. Music can stimulate 'complex cognitive, affective and sensorimotor processes' in the brain, mostly by the beneficial effect of music and rhythm and its motivational use (Thaut, McIntosh, & Hoemberg, 2014). Rhythm is seen as the basic element in this process, whereas research on effective rhythmic engagement revealed that emotional expression can become structured through one's ability to synchronize to an external beat – a human capacity (Koelsch, 2015). Synchronization of rhythmic movements might increase trust and cooperation, which is essential for survival, by moving bodies and voices in time (like rapping to a beat), and embodies feelings of being together (Gill, 2012; Koelsch, 2015). The engagement seems to be stronger in rhythmic movement to music and other sounds than to speech (Zentner & Eerola, 2010). Research reveals the close relationship between music and speech, as both use pitch, timing, and timbre to convey information (Kraus & Chandrasekaran, 2010), and both are rhythmic, involving systematic temporal, accentual, and phrasal patterning of sound (Patel, 2008a; p. 176). This patterning of sound is similar in music and speech, tones and words get grouped into phrases, whereby linguistic rhythm interacts with phonological phenomena, and musical rhythm follows organizing principles (Patel, 2008a; p. 177). Key processing of synchronization with a beat requires tight auditory-motor coupling for both movement and speech, 'which suggests that the capacity to synchronize with musical beat resulted from changes in brain structure driven by the evolution of complex vocal learning' (Patel, 2014).

Melody is built around a stable set of pitch intervals and allows the creation of a tonal center, according to Patel (2008a, p. 183). Melody can be seen as a network of interconnected patterns of pitch variations, carrying an esthetically important, and therefore emotionally potent meaning, as described by Shaheen as 'group of tones in love with each other' (quoted by Hast et al., 1991, in Patel, 2008a; p. 184). Singing, as a natural human expression that does not depend on any vocal training, is uttering sounds or words to produce musical tones by means of the human voice. Singing is centered around pitch, melody and rhythm, engaging an auditory-motor feedback loop in the brain more than most other musical processes (Wan et al., 2010) and can stimulate alternative ways of information exchange in the brain. Singing reflects both right side dominance and left side activity and involves a stronger emotional component than non-vocal musical activities (Callan et al., 2006). In linguistic and musical contexts of pitch, there seems to be overlap, but with greater reliance on right-hemisphere structures during singing compared to speaking (Zatorre & Baum, 2012). Generally, singing is perceived as a pleasurable expression to enhance motivation, and can even increase attendance rates in music therapy (Dingle, Gleadhill, & Baker, 2008; Merrett, Peretz, & Wilson, 2014).

Natural vocalizations, whether rhythmical speech in rap (e.g. to call, speak, exclaim, recite), or melodic lines in singing (e.g. to hum, chant, belt out), can express and modulate positive and negative emotions. In this expressive vocal process, self-regulative skills can be trained by developed self-awareness, whereas the rewarding and emotionally evocative nature of music (Patel, 2011) contributes to well-being. Strengthening this Self by means of self-regulative skills, could be a motivating way to affect one's self. Consequently, to distinguish these characteristics and to define methods of the use of rapping and singing in music therapy, more investigation in the applied interventions are required. So, the question in this study is how do music therapists offer rhythmic patterns (e.g. programmed loops of rhythms), practice motor control (e.g. movement), speech (vocalizations in rapping and singing), to support synchronization processes in music and enhance vocal learning.

Objectives

Since rapping in music therapy can incorporate potentially offensive material and possibly transform it (Short, 2013), deal with problematic situations, regulate emotions and strengthen the Self, it might benefit from a detailed description of interventions. To better comprehend rapping and singing in music therapy, information on its use, frequency, treatment goals as well as applied musical parameters has been collected. This information aims to identify characteristics of the use of rapping and singing, in order to define common standards of clinical practice (Wigram, 2005). This should provide material to enhance rap and sing engagements in the treatment of at-risk youth, including the important cultural subjects of rap addressed by Viega (2015). Music therapy practice requires detailed descriptions of interventions, treatment goals and additional information for the development of specific protocols for clinical replication purposes and research (Robb, Burns, & Carpenter, 2011).

Method

This survey design included the use of quantitative and open ended questions. A group of expert music therapists of rap and sing engagements discussed relevant key topics that would be meaningful to the survey. From this discussion as well as their personal music therapy experiences of applied rapping and singing, the researchers developed the topics for the survey. A commitment to studying a variety of Rap Music Therapy approaches for youth requires more methodical and conceptual constructs as well as clear explanations about their designs (Aigen, 2008; Edwards, 2012). The lack of descriptions for the application of rapping and singing in therapy and the development of tools for research and teaching, indicate a need for the enhancement of rap in music therapy (Hakvoort, 2015; Uhlig, Jansen, & Scherder, 2015). The developed key topics were framed into questions in order to construct a Dutch Survey, which was presented to colleagues for peer review. Key topics and questions concerned the descriptive use of rap and sing engagements, the roles of musical parameters, the intended treatment goals as well as observed changes during rapping and singing. After reformulating the questions, a web-based Belgian survey developer tool was used. In order to receive the best possible answers, multiple-choice questions as well as open ended questions were asked to receive quantitative as well as narrative results. Constructing different epistemological concepts into this design, a positivistic and phenomenological view of theories and practices was combined. First, the positivistic objectivity of the observer was granted by focusing on facts, second, the music therapists were part of the observation by focusing on their meanings and interpretations. This phenomenological view was applied for the illustration of individual insights of music therapists. The positivistic rationale assessed and compared the large amount of collected facts of observations from music therapists, and required statistical analyses to test our neurological theory. The phenomenological view assessed the complex reality as a phenomena, and required a community interpretation of meanings, motivations and values of music therapists (Ansdell, 2002), and their used patterns to develop a theory for further research. The Dutch Association for Music Therapy granted authorization and approval for registration and collection of data. The survey questions were sent to all music therapists, who were members of the Dutch Association for Music Therapy (NVvMT).

Participants

The survey was sent to 336 music therapists, all registered with the NVvMT to ensure the most accountable amount of responses. There were no expectations about a representative sample since therapists working with youth and young adults as well as with different populations could respond to the survey. Some of them had worked in the past with youth populations, using rap and sing engagements, while others were registered within another fields but worked part-time (e.g. private practice) with youth. The expected response rate was around 30% of the total number of music therapists who received the survey.

Criteria for inclusion

Music therapists working in clinical/educational settings, such as: child and youth psychiatric units, specialized youth settings, youth and young adults forensic/detention units, special education institutes, and adult (forensic) psychiatric units were included. Music therapists who currently apply or have used rap and sing engagements in the above settings with clients between 10 and 29 years old fulfilled the requirements of inclusion.

Criteria for exclusion

Music therapists working with non-verbal clients and music therapists who only apply music listening/receptive techniques were excluded. Music therapists who did not respond to any of the questions about the application of rapping as an therapeutic intervention did not fulfill the requirements for inclusion.

Table 1. Overview of themes of survey

Survey themes	Questions	Design	Figure
Use of rap and sing engagements	Descriptive data of music therapists working with rap and sing engagements	Quantitative	Figure 1
Roles of the musical parameters	Role of rhythm in rapping Role of melody in singing	Interpretative	Figure 2
Intended treatment goals during rapping and singing	Changes in emotional engagement	Quantitative	Figure 3
	Changes in cognitive functioning	Quantitative	Figure 4
	Changes in sense of self	Quantitative	Figure 5
	Types of observed changes	Interpretative	Figure 6

Procedure

A descriptive questionnaire-based survey was designed to examine the treatment approach towards an intended use of rap and sing engagements in music therapy. Descriptive surveys are designed to accurately portray the characteristics of particular individuals, situations, or groups (Wigram, 2005). To find representative identification patterns in rap and sing engagements for descriptive purposes, phenomenological and neurological concepts were applied to develop the objects for the survey. The phenomenological concepts were based on principles of community music therapy, such as collaborative musicing (Pavlicevic & Ansdell, 2009), in order to cultivate a community of therapists and clients working with youth, and 'to negotiate this with an awareness of social and cultural context', following Ansdell (2002). Complementary, individual and group sessions were analyzed within this context, and included various approaches with different inter-personal affiliation, emotional exploration or communal feelings and encounters (Ansdell, 2002). Experiences of experts combined with existing videos of rap music therapy sessions were analyzed to distinguish and select categories for the survey questions.

Theoretical concepts, as distilled from the neurological research about the hypothetical role of applied musical parameters during rapping and singing, were used to define the objects of the survey: e.g. rhythm, rhythmical engagement and movement, rhythm in speech and music, melody in singing, sound and word phrases, verbal learning and development of lyrics in songs. Additionally, professional approaches and clinical expertise about perception, observation and treatment goals were identified as requirements for collection of data. To better understand personal experiences and explanations of individual music therapists, open ended questions were included as part of this project. The questionnaire consisted of 25 questions divided into 3 different themes (see Table 1): with 21 quantitative and 4 open ended questions (mixed design). The questionnaire was designed to encourage music therapists to compare the use of singing and rapping.

Analysis

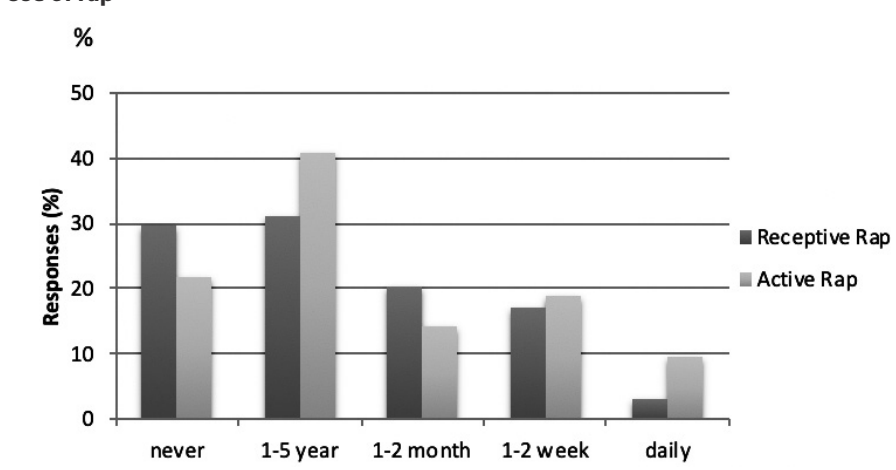
To achieve the highest possible level of validity in this survey-based research, precautions were taken in order to meet research quality standards and avoid biases. The anonymity of the respondents regarding survey privacy and confidentiality was accounted for. The statistical analysis was executed through a standardized computer program (IBM-SPSS Statistics, version 21), using a chi-square test of association to compare the differences between the subjects (Wigram, 2005). The results of the quantitative questions were calculated and cross-tabbed in an attempt to examine similarities and differences amongst the responses, based on the following variables: 1) therapists' work experience 2) therapists' work setting 3) therapists' gender. In order to ascertain whether the work experience, setting and gender of the therapist plays a role in the use of rap and sing engagements, the researchers checked whether there were statistically significant differences in the data (p value <0.05). The responses of the (4) open ended questions were anonymous, and were analyzed by a panel of music therapy experts who work with various client groups. Attempts for trustworthiness were made by the researcher about judgments, and care was applied during the process of thematic coding (Aigen, 2008; Edwards, 2012). Following the principles of content analysis, peer briefing through consensus-based coding helped to categorize the answers, using colors of categories. Application of an inductive approach has been performed whereas codes, categories, or themes are directly drawn from the data. As a process of understanding reality through interpretation of a variety of verbal materials and processing large quantities of data (Cho & Lee, 2014), inductive analysis distinguished 10 themes from the answers of respondents. This defined the roles of rhythm and melody and their functions during rapping and singing: structure, base, emotional experience, support of flow, voice and timbre, posture, facial expression, eye contact, lyrics. Concepts of the sense of Self in this research were defined by the process of internally developing identity and behavior adaptation, whereas Self-awareness was seen as the capacity for introspection (translations from Dutch zelfbesef and zelfbewustzijn). Self-awareness and introspection affect the way we view ourselves (Goleman, 1995). Emotional engagement was defined as the perception of the client to sense emotions (translation from Dutch emotionele beleving), whereas during increase the person gets more involved in her/his emotion and during decrease the person can calm/manage his/her emotions. Both are related to the development of emotional skills, based on principles of emotional intelligence: Self-awareness: e.g. to recognize and understand one's own emotions and behavior, introspection; Self-management: e.g. to control and manage impulsive feelings and behaviors (Goleman, 1995).

Results

Demographic data

From the 76 received survey responses, 12 did not meet the inclusion criteria; therefore the included survey entries in the statistical analysis amounted to 64. Most of the music therapists who filled out this survey were female (63%), and 52% were older than 40. The majority of them had work experience of less than five (35%) or more than 20 years (27%). Although this was a survey on youth and young adult populations, the majority of the music therapists worked with clients between 12 and 18 years old (32%) and 25–29 (38%); a smaller group with ages between 5 and 12 years olds (8%) and 18–25 years old (22%). The respondents worked both with groups and individual clients (58%) on rap-songs as a product as well as on its process (72%). Furthermore, around 76% of the respondents indicated that the client kept their song(s) either on sheet or recording after termination of the music therapy treatment (more answers were possible). Fifty-two percent of the music therapists made a recording of the song for the client, 44% kept the song within the client's files and 37.5% used the song for further performance purposes.

How often do you use rap interventions in your clinical work?



How often do you use singing interventions in your clinical work?

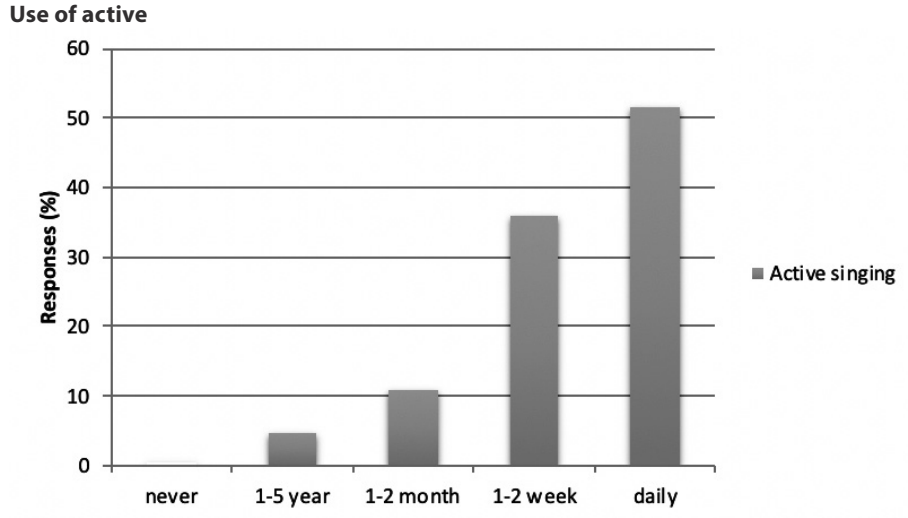


Figure 1. Amount of time per year music therapists work with rapping and singing interventions.

Frequency of rap and sing engagements

All 64 respondents used singing on a daily or weekly basis (Figure 1). Although there were therapists who used rap styles as a daily intervention (actively or through listening), forty percent of them used it less often, between 1–5 times a year as an active intervention. Almost a third of the respondents never used rap styles as a listening (receptive) intervention. Fifty two percent of the music therapists revealed that singing was used on a daily basis. Since singing is an activity, it was not investigated as a listening (receptive) intervention. Music therapists spend an average of 2–3 sessions per song with their clients. Statistical analysis yields a significant difference ($p < 0.05$) between clinical settings in the amount of time spent on a single song or rap: therapists in a psychiatric settings tended to work 2–3 sessions on the same song, while therapists working in special education or forensic facilities used the same song between 4 and 10 sessions.

Musical parameters rhythm & melody

Respondents were asked to elaborate on the role of rhythm and melody for clients who actively rapped or sang, described in their own words. A panel of three experts coded all answers, according to the content guidelines (Cho & Lee, 2014) and defined: large role, small role and no role accordingly. Results of Figure 2 suggest that rhythm plays a central role in structuring emotions (50%). Melody plays a leading role in forming emotional expression (95%). Since both are independent parameters, we cannot compare the two. However, the results suggest that according to the music therapists, rhythm has a smaller role in structuring emotions than melody in forming emotional expression.

How important is the role of rhythm: structuring emotions? How important is the role of melody: forming emotional expression?

Roles of rhythm and melody

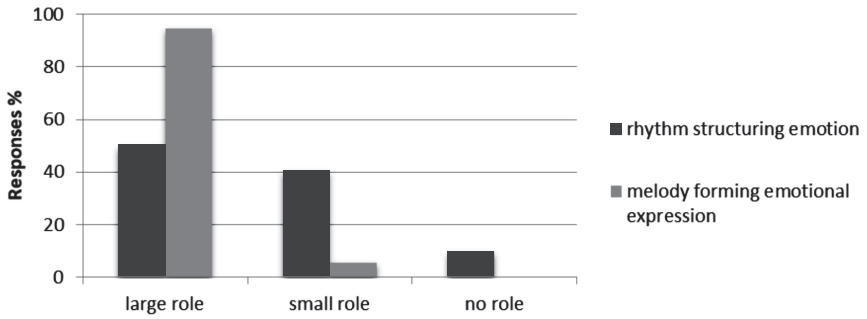


Figure 2. The role of rhythm in structuring emotions and the role of clients' enhanced self-esteem melody in forming emotional expression.

Intended treatment goals

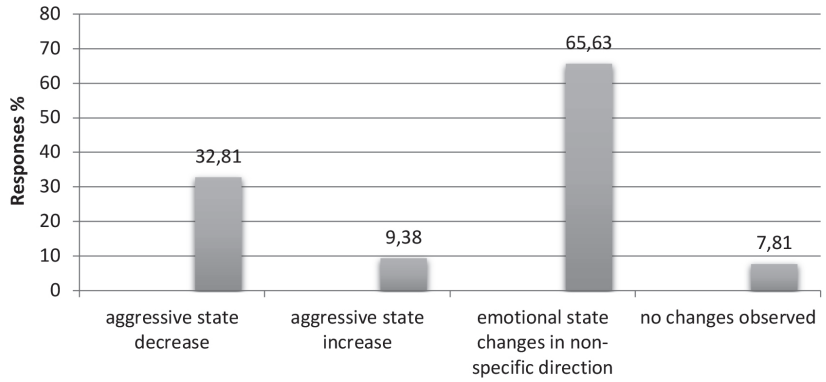
There was a high level of agreement (around 80%) about the central goals of rap and sing engagements during music therapy with at-risk youth and young adults (more answers were possible). Rapping and singing was applied to: 'support individual expression' (86%), 'strengthen the sense of self' (83%) and 'regulate emotions' (77%). Practicing social skills was the fourth most common goal (44%) (more answers were possible).

Observed changes of emotional engagement

The music therapists were asked to define what kind of changes they perceived in their clients when actively applying rapping or singing. Most music therapists observed changes in the emotional engagement in non-specific directions of clients up to 70% for both interventions (more answers were possible). More specifically, they observed a decrease of aggressive state (33%), as manifested in physiological and behavioral reactions during rapping, and an increase of emotional state (53%), during singing in non-specific directions (Figure 3).

What kind of changes do you observe in clients' emotional engagement during rapping?

Kind of changes Rap: emotional engagement



What kind of changes do you observe in clients' emotional engagement during singing?

Kind of changes Singing: emotional engagement

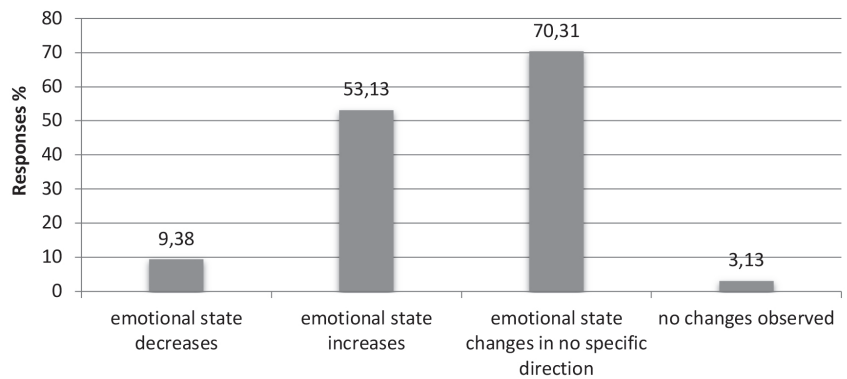


Figure 3. Reported changes in the emotional engagement of the client through rapping and singing.

Observed changes of cognitive functioning

Figure 4 describes the perceived changes in cognitive functioning of the clients according to the music therapists (more answers were possible). The largest increase is shown in understanding the intention of therapy, such as improved awareness of its content (56%). Interests in rhyme, in words and in language development increased equally (each 42%), followed by a small improvement of language awareness (25%).

What kind of changes do you observe in clients' cognitive functioning during rapping/singing?

Changes cognitive functioning

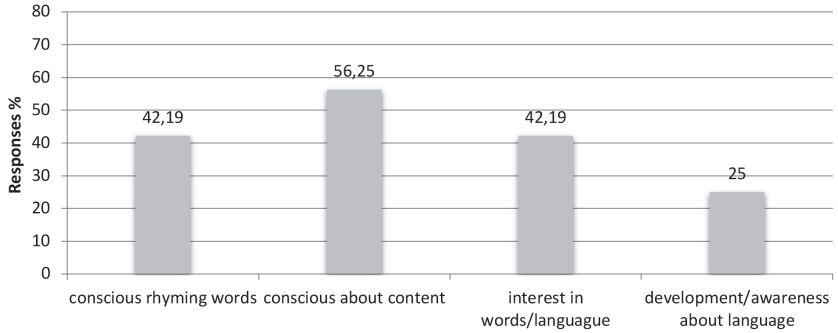


Figure 4. Reported changes in cognitive functioning of the client through rapping and singing.

What kind of changes do you observe in clients' sense of self during rapping and singing?

Changes sense of self

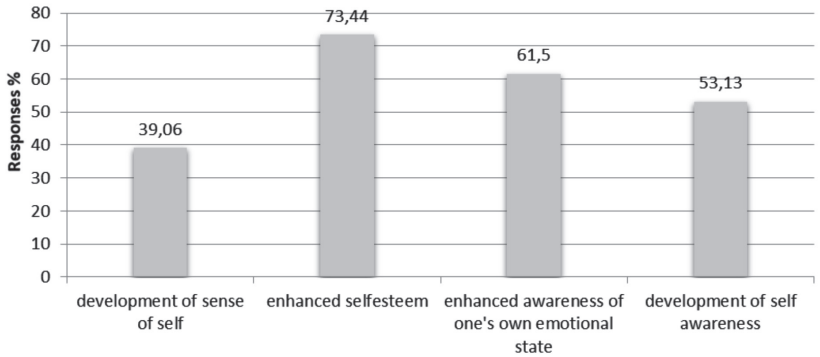


Figure 5. Reported changes on sense of self of the client through rapping and singing.

Observed changes of sense of self

Therapists reported changes in the self-perception of their clients, especially an improved 'sense of self' after rap and sing engagements (more answers were possible) (Figure 5). The respondents reported major changes in their enhanced selfesteem (73%) and increased awareness of their emotional engagement (61%). Moreover, the music therapists observed growth in their clients' self-awareness (53%) and developed sense of self (39%).

Observed changes

The rap and sing engagements were compared to the reported changes, and clustered according to the individual answers of the music therapists on the open ended questions (Figure 6). The panel of three experts coded all answers, according to the requirements, as mentioned above (Cho & Lee, 2014), and defined six engagement elements: emotional experience, sound of voice, posture, facial expression/eye contact, expression, lyrics. Results suggest that most therapists observed stronger changes with singing engagements compared to rapping. Figure 6 displays the most observed changes and its manifestation in the respondents' comments. Particularly, emotional experience differed between the singing engagements (23%) versus rapping (15%).

If you notice changes in clients' emotional engagement, what do you observe during rapping and what during singing?

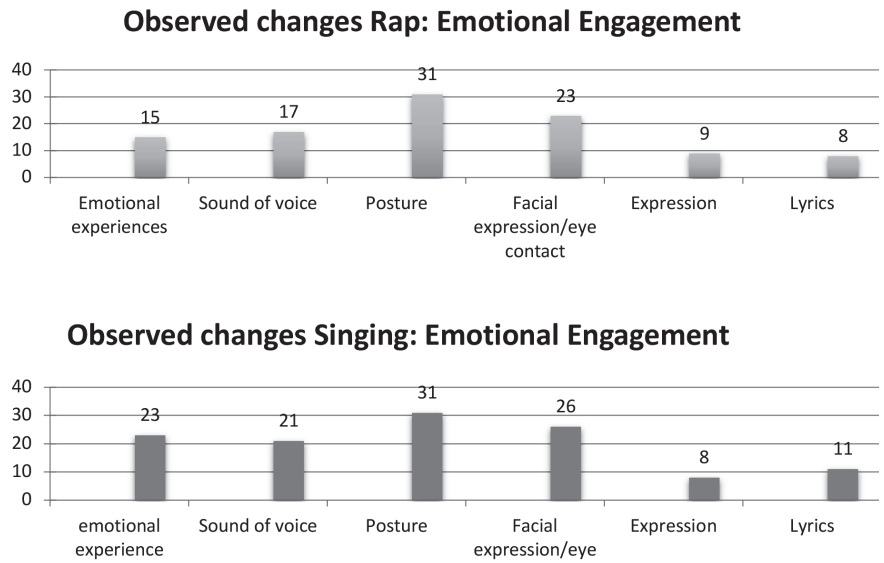


Figure 6. Reported changes in the emotional engagement of the clients.

Discussion

This survey study found a wide variety of approaches towards frequencies, functions and applied musical parameters of rap and sing engagements by (Dutch) music therapists while working with youth and young adults at-risk. There was a greater consent about the treatment goals of rapping and singing in music therapy. Therefore, the general approach of the music therapist towards the application of rapping and singing as well as treatment goals will first be discussed by identifying their characteristics. Secondly, common standards of clinical practice will be defined for the development of Rap Music Therapy protocols for practice as well as the purpose of research.

Approach towards singing & rapping

All respondents used singing on a daily or weekly basis. Some music therapists used rapping actively as a daily therapeutic intervention, but most of them used it considerably less often. This seems to suggest that music therapists might be more familiar with singing than with rapping. The reason for this difference was not investigated, nor was there a comparison between preferences in musical styles. Likewise, there were no inquiries into which styles clients sang or rapped, e.g. singing ballads, metal, punk or gospel songs, or softer or harder styles of rap. These subjects might be related to particular needs of the client, to an (un)familiarity with rap by the music therapists, not matching treatment goals, not meeting the client's musical responsiveness, or the suggestion that singing might aid the client's emotional expression differently than rapping does. There was no gender difference in the use of rap and sing engagements reported, even though a larger amount of female music therapists participated in this study.

Agreement about therapeutic application

Further results indicate that most respondents used rap styles therapeutically as a product as well as for the treatment process. During this process of active writing and composing, therapists needed to adjust to the client's requirements and employed different approaches and timeframes. Music therapists in educational or forensic/detention settings spend significantly more time on the same song than those in psychiatric settings. These differences could be related to dissimilarities in developmental levels of clients, a need for repetition to train skills, different treatment goals, or difference in treatment length.

The results of the survey suggest a high level of agreement on treatment goals. Rap and sing engagements were mainly applied to pursue therapeutic goals such as "support of individual expression", "enhancement of sense of self", and "emotion regulation". Rhythm played a primary role in rap, to structure rhyme and sustain flow processes as support for emotions. Melody was fundamental for singing and was associated with the reinforcement of emotional expression. The open ended questions offered therapists opportunities to report more deeply about their observations, and to make statements. These valued personal views show great exemplarity (e.g. the used examples below), and present no scientific validity but illustrate individual wisdom. Therapists witnessed more changes in emotional state during singing: clients' emotional and facial expressions changed, as well as timbre and dynamics of their voices. Therapists' answers suggest that if clients sing, they are intensely emotionally engaged in their individual expression. While there is no main difference reported in the body posture of the clients during rapping compared to singing, a respondent described a striking variance:

'Clients seem to be more motionless during singing in comparison to rapping. During rapping they move with their complete body to the beat. During singing they stand more quietly, eyes closed, only arm movements. . . it seems that singing might bring them more back into their inner emotions'. (Respondent A)

Additionally, therapists suggested an underlying regulative process of emotion modification during rapping, especially a decrease of aggressive states. These results suggest that rapping engagements can aid emotional regulation in a different direction than singing:

'Rap is often chosen by the more tense or expressive clients. It is beautiful to see that, after a couple of raps, they feel comfortable enough to include melody [in their music making], for example through singing ballads. The pressure/tension decreases and more room occurs to experience other or deeper emotions'. (Respondent B)

However people can also sing or rap without moving due to any formal or no training. The rap movements might be inferred from viewing rap music videos, so movements might also be culturally based. Besides movement and emotional effects, therapists reported cognitive effects of rap and sing engagements: clients become more aware of the content of their therapies, and develop more interest in rhyming words and language. These facts suggest an improved engagement of clients in their personal and social processes during music therapy treatment, as described in literature about (difficult-to-engage) youth (Hadley & Yancy, 2012; Hakvoort, 2015; Travis, 2013; Viega, 2013; Uhlig, 2011).

Standards for clinical practice

Generally, this study found that both rap and sing engagements were used for specific therapeutic goals enhancing self-regulative skills. However, rapping appeared to be a less popular therapeutic intervention for the music therapists than singing. When combining the results of this study with the literature several reasons are suggested:

Singing

Engagements seem easy accessible and more familiar in every-day practice of music therapists. There is substantive research literature on the positive effects of singing both in and outside of music therapy as well as the methods offered (Baker & Uhlig, 2011; Callan et al., 2006; Clift et al., 2010; Leins et al., 2009; Wade, 2002; Wan et al., 2010; Winsler, Ducenne, & Koury, 2011).

Rapping

Engagements are less familiar among (Dutch) music therapists. Hiphop was not a mainstream musical culture in the Netherlands but has grown explosively by the use of the Dutch language, especially when developed as a music style called "NEDERHOP", an equivalent to English spoken HIP HOP. Addressing serious and humorous themes, mostly performed by rappers of white or different ethnicities, NEDERHOP is easily understandable to everyone and has gained more popularity through the years (Pennycook, 2007). Rap styles are regularly applied in music therapy sessions but without exploited methods (Hakvoort, 2008, 2015; de Witte, 2015). Research on the effect of rap music therapy is scarce. There are quite a number of music-focused rap engagements (Hadley & Yancy, 2012; Hakvoort, 2008, 2015; Travis, 2013; Uhlig, 2011; Viega, 2013, 2015), yet hardly any of them are systematically, quantitatively investigated with a substantial numbers of participants. There are a limited amount of rap music therapy approaches for at risk youth, but no standardized rap-methods offered within the profession. Rap is often associated with a particular client group of youth at-risk (Ahmadi & Oosthuizen, 2012; Donnenwerth, 2012; Hadley & Yancy, 2012; Ierardi & Jenkins, 2012; Lightstone, 2012; McFerran, 2012; MacDonald & Viega, 2012), although respondents serving a wider range of populations report beneficial effects of the rap-engagements. As an example, the British platform, HIP HOP PSYCH (2014), developed by a psychiatrist and neuroscientist, links Rap and Hip Hop to therapy and psychiatric illnesses, indicating the need for further investigation and documentation of this subject. There are missing links between the approaches within the (music) therapy profession: while clients could benefit from refined rapping engagements and therapists could benefit from defined methods for effective application, this approach is still lacking amongst the number of (music) therapists using rap styles in their practice. Whatever the cause, the results of this study call for specific rap-protocols and training to especially encourage music therapists and students to use specialized methods for treatment (Hakvoort, 2015), similar to the collection of voicework-methods for practice and research (Baker & Uhlig, 2011). The development of Rap-Music-Therapy protocols with incorporated results from music research are necessary to develop a higher quality of treatment, aiming the provision of evidence towards the clinical and professional development of specific methods as well as for research purposes. Such a Rap Music Therapy intervention protocol for research and training purposes encourages future implications as well as supports enhancement of specified treatment goals (Uhlig et al., 2015).

Challenges of the study

The authors aim to describe approaches and applications of rap and sing engagements, but are aware of the limitations of this study. Any conclusions and generalizations to the population of music therapists or youth and young adults at risk should be taken with caution because of the relatively small sample-size (N = 64). According to the Dutch Music Therapy association, 48% of its members work with youth (NVvMT, 2013), nearly half of them responded to this survey. A response of 64 useful surveys is a small sample of just over 40% of the total number of Dutch music therapists working with youth and young adult populations. Respondents were not from a homogeneous population but had different professional settings, ages and years of work experience. They are experts and reveal results from their personal perspective and experiences. There was no investigation into cultural subjects and the consequences of them during therapeutic relationships with clients. Quantitative questions were brief and relatively simple, limited to a maximum of 21 questions. No precautions were taken to check for misinterpretations. It was not possible for the researchers to check the accuracy of the answers. Some relevant topics might not have been addressed by the music therapists, so some results may have remained oblivious to the authors. Due to the small N, a need remains for empirical research regarding the information in Figs. 2–6. All involved researchers aimed to provide transparency during this process, their insights and personal reflections. During this process and emerging from our discussions, personal insights progressed into the lived experiences of agreements about coding and

themes, as well as the identifications of key words. Also, a balance was needed between the value of large quantitative and limited interpretative data; and was finally set according to practical suitability. The number of roles of researcher to prepare; conduct; analyze; describe and revise the study challenged everyone; finally revealing the strength of each team member.

Conclusion

The results of this questionnaire-based study suggests that rapping in music therapy is used by music therapists to structure emotional expression and might be beneficial for treatment goals that aim for aggression regulation and/or a decrease of tension. Singing is based on melodic lines and is used to support expression of deeper emotional involvement. Both singing and rapping engagements seem to be appealing treatment approaches for at-risk youth and young adults to affect their emotions, to enhance self-esteem, and increase awareness of emotional engagement. Besides the growth of self-regulative skills as attainable goals, therapists suggest an increase in cognitive functioning by way of an enlarged interest in words, language and the understanding of therapy relevance.

This study about the practice, frequency, function and effects of rap and sing engagements in music therapy and the description of its musical parameters provides a better understanding for possible implementation in the treatment of youth and young adults at-risk. It calls for more empirical research and requires educational protocols for music therapists to encourage more detailed applications.

Bullying isn't fun
So let's just get along
It hurts to be picked on
That's why we sing this song[12]

[12] American English Languague translation of the original Dutch group rap, created by adolescents during the performed Rap&SingMT, as the subject *bullying* suddenly appeard: "Pesten is niet fijn, want het doet veel pijn, pesten brengt veel verdriet, daarom zingen wij dit lied!"

Chapter 3

Study Protocol RapMusicTherapy for emotion regulation in a school setting

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Abstract

The growing risk of the development of problem behaviors in adolescents (ages 10–15) requires effective methods for prevention, supporting self-regulative capacities. Music listening as an effective self-regulative tool for emotions and behavioral adaptation for adolescents and youth is widely studied. However, music therapy enhancing the development of emotion regulation skills in schools is rare. The application of rap in clinical cases of music therapy appears to have a beneficial regulative effect on this population. The aim of this study is to investigate the performance of RapMusicTherapy (RMT) in a non-clinical, school-based program to support self-regulative abilities for well-being and to reduce the risk of low grades attributable to troubled mental health at an early stage.

All adolescents in Grade 8 of a public school will be invited to participate, and randomly assigned, either to RMT or to regular classes. RMT will be applied once a week during 4 months. After obtaining written informed consent by parents, measurements will take place at baseline (start of study), after 4 months (end of RMT) and again after 4 months without RMT (follow-up). Primary outcome data include measures of psychological well-being, emotion regulation, self-esteem, self-description, language development, executive functioning and the rest–activity rhythm. Secondary outcome data consist of subjective experiences of participants, collected in follow-up interviews with experimental group respondents.

RMT is developed for application in school-based settings. This is the first study to focus on RMT as an intervention for emotion regulation in order to evaluate the effects of rap on the self-regulative capacities of adolescents, in support of their well-being. This study protocol aims to outline the method and procedures involved, and to increase attention and awareness of the potential for collaborations involving music, therapy and education for future investigations.

Introduction

According to the Dutch Institute for Youth (Nederlands Jeugdinstituut, 2014), the growing population of children, adolescents, and youth with anti-social behavior (CD/ODD, attachment disorders, ADHD) requires more effective protocols for treatment as well as for prevention of problem behavior. Violence, abuse, and neglect in parental and social environments are typical potential sources for the development of psychopathological behavior (van Dam, Nijhof, Scholte & Veerman, 2010). A study evaluated Dutch youth treatment programs for juvenile care (N = 514; mean age = 15), and presented a high rate of levels of trauma: 56% of the males and females showed co-morbidity and trauma, often not or only partly diagnosed (van Dam et al., 2010). Reports from the UK support the Dutch findings and state that 1 in 10 children and adolescents aged between 5 and 15 are diagnosed with mental health problems (Carr & Wigram, 2009). A large socio-demographic study from the USA (N = 10,123) claims that one in every four or five adolescents has a mental health disorder: the biggest group showed patterns of anxiety disorder (31.0%), followed by behavior disorders (19.1%), mood disorders (14.3%) and substance use disorder (11.4%) (Merikangas et al., 2010). Additionally, the correlation between well-being and psychopathology in middle school showed a decline in academic achievement of troubled mental health students (N = 300) at a significantly fast rate (Suldo, Thalji & Ferron, 2011).

In order to prevent or reduce the risk for mental health disorders, the development of selfregulative capacities necessary for dynamic and reorganizational processes of emotional and behavioral adaptation is desirable (Blair & Diamond, 2008; Crocker 2002; Diamond & Lee, 2011; Porges, 2011). Difficulties in emotion regulative capacities are reported by clinical studies of patients with ODD/CD, (comorbid) behavioral difficulties, childhood depression, Borderline Personality Disorder and anorexia, caused by stress, traumatic experiences and family dysfunction (Mennin, Heimberg, Turk & Fresco, 2005; Uhlig, Jaschke & Scherder, 2013). Classroom studies demonstrate that the primary sources of difficulties in schools are related to problems with self-regulation, in particular with respect to directing and controlling attention and behavior impulses (Blair & Diamond, 2008; Kovacs et al., 2006; Lewit & Baker, 1995; Raver, 2002). To prevent underachievement at school and to encourage children to develop self-regulation abilities at an early age, interventions for motivational engagement seem particularly appropriate (Aldao, 2013; Blair & Diamond, 2008; Gross, 2002; Turner & Husman, 2008).

Therefore, collaboration involving music, therapy, and education seems desirable, to perform multidisciplinary studies, and to bring music back into the classroom to facilitate the healthy development of children and youth (Kraus, Hornickel, Strait, Slater & Thompson, 2014a). This study protocol describes the planned performance of a Randomized Controlled Trial (RCT), and presents its characteristics and the challenges of applied music and assessment. RCTs are never sufficient by themselves without further explanation of the complexity of the applied interventions and measures (Victora, Habicht & Bryce, 2004).

Music and self-regulation

The supposed self-regulative capacity of music presented in this study may motivate engagement, modulate impulses, and offer coping strategies for the well-being of adolescents. The interaction of music with neural functions for modulating emotions, affecting mood and stress, has been extensively studied (Janata & Grafton, 2003; Jeffries, Fritz & Braun, 2003; Juslin & Laukka, 2004; Koelsch, 2011; Koelsch et al., 2013; Laiho, 2004; Molinari, Leggio & Thaut, 2007; Saarikallio, 2008; Sloboda & O'Neill, 2001; Stegemann, 2013). Moore (2013) presents preliminary neurological evidence for the specific use of music listening, singing or improvising in facilitating emotion regulation in music therapy. The potential of music in regulating emotions occurs because, if sensory information is unthreatening, amygdala activity decreases. Mostly, music is unthreatening, but some clinical interventions involve therapeutic stimulation to maintain or increase amygdala activity. This in turn intensifies the emotional experience in response to pleasant and unpleasant sounds (Moore, 2013), which are crucial for the regulative process of behavior change. Commonly, music listening is demonstrated as a self-regulative tool for youth (Miranda, 2012; Rentfrow, 2012; Saarikallio, 2008; Saarikallio & Erkkilä, 2007; Thoma et al., 2012b), and is viewed as a very individual but cross-culturally accepted, therapeutic instrument (Uhlig et al., 2013). Likewise, increased behavioral self-regulation through singing improved with age, as reported by Winsler, Ducenne, and Koury (2011), who studied 3–4 year olds. Support for effective self-regulation in clinical cases of music therapy is presented by Plener et al. (Plener, Sukale, Groschwitz, Pavlic & Fegert, 2014; Plener, Sukale, Ludolph & Stegemann, 2010), who worked with self-injuring adolescents using rock music. Similarly, music therapists (Hadley & Yancy, 2011; Viega, 2013) present cases of adverse childhood experiences and difficult-to-engage youth and their ability for emotional transformation. They describe the use of rap for self-regulation, development of coping strategies and behavioral changes. Specifically, rap is used to motivate youth to engage in their personal and social identification process, and to modulate behavior during their music therapeutic treatment. Rap is a "bridge" between talking and singing because it creates a safe environment where primary emotions can be expressed vocally and transformed into words (Uhlig, 2011a). Rap is based on rhythm and offers a predictable, grounding pattern, while creating stability and reliability for the expression of "true" feelings (Short, 2013). Rap is often associated with negatively influencing youth due to its promotion of antisocial messages of violence (Short, 2013), whereas the use of rap in music therapy engages and reflects upon these negative themes, supports the expression of the personal, the "true" emotions, and helps them transform. These results from music therapy suggest that rap interventions can aid emotional regulation and might decrease aggressive states (Hakvoort, 2015; McFerran, 2011; Short, 2013, Uhlig, 2011ab; Uhlig, Dimitriadis, Hakvoort, Jansen & Scherder, 2016). The preference of youth for popular music, such as rap, hip hop and rock, plays a central role for their personal well-being, as a means of improving insight into their lives by allowing them to express and discuss these emotions and thoughts in music therapy.

Main study

Music intervention. Despite these regulative benefits of music for (non)-clinical populations, quantitative studies of music therapy interventions in schools for the enhancement of emotion regulation skills for well-being are rare. Using rap as a motivational tool for an early intervention to combat possible threats to mental health in adolescence seems a suitable therapeutic application, although behavioral problems are likely develop around the age of 11 (Merikangas et al., 2010). This study is set up as a school-based classroom intervention, to reduce the risk of development of problem behaviors and poor grades. RapMusicTherapy (RMT) employs a therapeutic structure with a regulative rhythmical framework, thereby facilitating the overall emotional expression of singing and rapping, and word development for rhyme in song-lyrics. Through rhythm and repetitive rhythmic engagement (Grahn, 2009; Thaut, 2013), rap might stimulate the brain by integrating and organizing sensations, whereas singing (Callan, Kawato, Parsons & Turner, 2007) can involve a greater emotional component in the brain adaptation necessary for learning (Leins, Spintge & Thaut, 2009). More specifically, the usefulness of rap comes from the application of rhythm for sensory coordination and entrainment, as well as by providing predictable patterns, which can serve as a grounding function. Entrainment, the process in which rhythms displayed by two or more

phenomena become synchronized, might develop:
with one of the rhythms often being more powerful or dominant and capturing the rhythm of the other. This does not mean, however, that the rhythmic patterns will coincide or overlap exactly; instead, it means the patterns will maintain a consistent relationship with each other (Bluedorn, 2002, p. 149).
Rhythmic patterns might entrain neural oscillators by stimulating them to maintain consistent relationships with each other, thereby enabling the synchronization of both perception and action (Janata & Grafton, 2003; Molinari et al., 2007; Thaut, McIntosh & Hoemberg, 2015). A melody can provide a recall aid supporting the singer/rapper to express emotions, to identify and recognize them in words, and to encode and retrieve a text by making it more memorable. RMT offers a predictable rhythmical framework in which information can be 'chunked into phrases' (Wallace & Hammill, 1994), and both positive and negative emotions can be exposed, processed, transformed, and regulated during live group performances. Individuals and groups of adolescents can take the lead in selecting styles, loops, or lyrics of the songs, and providing a platform for group discussion. The potential modulation of impulses through the rewarding and emotionally evocative nature of music (Patel, 2011) can be a crucial process for adolescents' development of well-being. Theoretical argumentation for the current protocol and the practices of music therapy for emotion regulation mentioned above are presented elsewhere (Hakvoort, 2015; Moore, 2013; Short, 2013; Travis, 2013; Uhlig et al., 2013).
The study population of "adolescents" is defined as such due to the majority of participants being between 9 and 12 years old. According to a differentiation between "children" and "youth" made by the United Nations: "children" is applied until age of 10, "adolescents" from 10, and "youth" from 15–24 years of age (United Nations, n.d.). Children and adolescents' early onset of mental disorders begins with anxiety around 6 years, with behavior problems following by 11 years old, mood disorders at 13 years, and substance use at 15 years old. Pathological symptoms increase in severity with age whereby adolescents generally show relatively fewer symptoms compared to (older) youth (Merikangas et al., 2010). The participation in RMT in a school-based setting may help to gain early benefits as a prevention strategy for the complex and emotional transition from adolescence to youth. This article on RMT describes a first investigation of applying rap and singing for emotion regulation in a school-based music (alteration) program for adolescents, promoting their healthy development (Kraus et al., 2014a). The RMT method aims to support emotion regulation as a stimulating approach for each individual to express emotions, and to identify and discuss personal, musical and peer preferences through rap and song in a safe therapeutic environment.

Method

Design

This study is designed as a randomized controlled trial (RCT) with adolescents in a public school in the Netherlands (see Figure 1). Furthermore, with the described intervention we will study the potential of rap and singing to support self-regulation of emotional processes and behavior. The development and performance of RMT is designed as an active music intervention. This study protocol articel describes this development and the characteristics of RMT prior to data analysis, as it is needed for RCT trials, to support analyses for adequacy and plausibility (Michie et al., 2011; Victora et al, 2004).

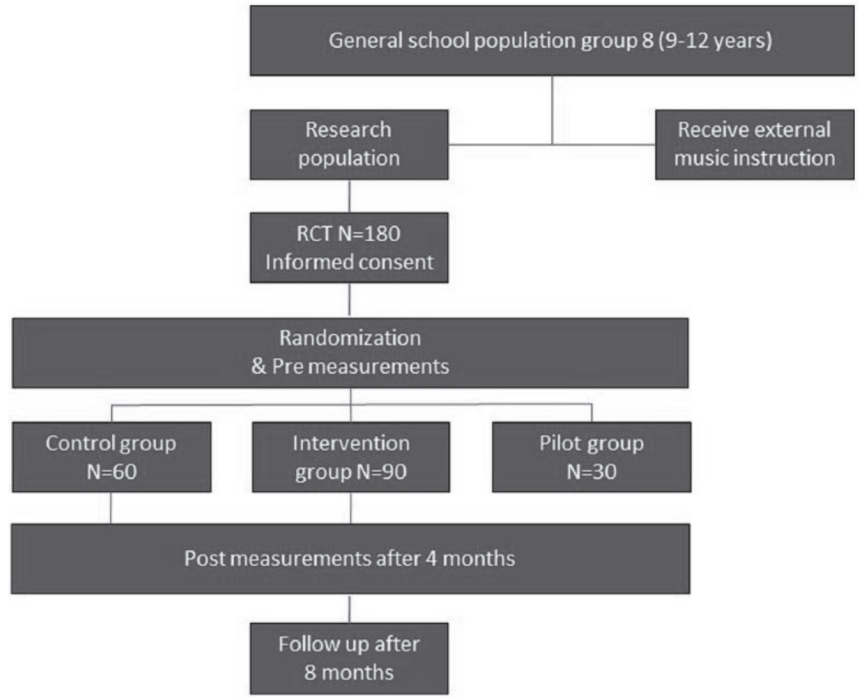

Figure 1. Trial design.

Randomization. All participating adolescents from Grade 8 will be assigned to music interventions (8 classes). Two classes will participate in an external music program and will be excluded from this research. Six classes will be selected for the RMT and will be randomly assigned for participation in this study (180 children): three classes will form the experimental groups (90) and two classes

will form the control groups (60). One class will be assigned to the pilot sessions (30) and will be excluded from the main research. A list of six classes will be sent to an independent researcher from Vrije Universiteit Amsterdam who will select the pilot, experimental, and control groups, blinded to the identity of the classes. After obtaining written informed consent from parents (for the pilot population as well), the researchers will start with the preparation of the RMT. Four performing music therapists of the RMT will be uninformed about adolescent's school records, behavior problems, difficulties, and diagnoses as well as which adolescents actually partake in data collection.

Intervention. Previous school-based prevention research suggests 8–12 sessions of 50–60 minutes is adequate for effectiveness of the program (Calear & Christensen, 2010; Merry, McDowell, Wild, Bir, & Cunliffe, 2004). This study will employ an estimated 16 sessions of 45 minutes a week. Ninety Adolescents, divided into three classes, will receive the RMT. This intervention is designed for large groups of 30 adolescents per class. Two music therapists will work together during 8 weeks in one class, after which the classes will be split into subgroups of 2 × 15 adolescents per class. Each therapist will then continue with a subgroup of 15 adolescents, working on specific group and individual themes, and preparing the group for recordings of individual or group rap-songs. Experienced music therapists, experts in using rap, will be hired and trained prior to performance of the RMT. Therapists and assistants will undergo supervision and evaluation sessions regarding verbal boundaries during rap, and considerations about therapeutic themes, such as relationships (Short, 2013), provided by the first author during the research project. Both RMT and control groups will receive instructions for 45 minutes a week during school time. The RMT will be performed by trained music therapists, and the controls will receive non-specific music instructions by classroom teachers.

RapMusicTherapy. The RMT protocol is designed to stimulate regulative emotional processing. A detailed description of the music-based intervention program of RMT, as performed in this study, will be presented in other studies for further research and transparency, as recommended by Moore (2013) and Robb, Burns and Carpenter (2011). The protocol is constructed around components of cognitive behavior therapy and psycho-education, and is based on three elements of music used for RapMusicTherapy: (1) rhythm, (2) vocal expression of singing and rapping, and (3) development of vocal work, words and song lyrics (Uhlig, 2011). These elements are elaborated on below.

1. *Rhythm and rhythmic stimulation have profound effects in sensory coordination* input to entrain timing functions (Thaut, 2013; Thaut et al., 2014), supporting synchronization of perception and action. By offering rhythmic patterns using programmed rhythms (loops) and body-percussion, motor control and speech in particular will be activated. Body percussion exercises combine visual and physical expressions and encourage synchronization and develop predictability. By repeating the rhythmic patterns of participants, adjusting their tempi and dynamics, the therapist establishes moments of entrainment and facilitates a grounding pattern for group stability.
2. *Singing engages an auditory-motor feedback loop in the brain* more than other musical modes (Wan, Rüber, Hohmann, & Schlaug, 2010). Singing reflects both right-side dominance and left-side activity and involves greater emotional engagement, thereby stimulating alternative ways of information exchange in the brain (Callan et al., 2006). By offering vocal sounds or words in a rhythm (rap), participants are invited firstly to imitate sounds, and secondly to stimulate the creation of more words. By fitting improvised or written lyrics into a rhythm and structuring vocal sounds, chunking words and developing poetic patterns, rhythmic speech and singing melodic lines induce mood changes. During vocal interaction the imitation of vocal sounds implements a call-and-response technique, with the aim of stimulating feelings of comfort, trust and pleasure.
3. *Vocal work encourages learning of verbal material through song* (Leins et al., 2009). By creating simple vocal rhythmical patterns, rapping or singing alone or together, repeating vocal sounds of participants to develop dialogue and contain feelings, a sense of safety and decreased anxiety is induced. Production of individual lyrics/poems is stimulated by combinations of methods applying a fill-in-the-blank technique, integrating increased communication during the interaction, exchanging emotions and feelings in sound, stimulating word recall and supporting further language development by rhyming more words.

The experience of emotional satisfaction when expressing and sharing pleasure, sadness or aggression in a rap or song will indicate individual changes. Trained therapists provide a structured and therapeutic environment, anticipate strong emotional expressions like offensive language used in rap or song (Short, 2013), and handle ethical themes with care. According to the need for adjustments, themes about performance or transfer will first undergo therapeutic consideration and will be completed by offering participants recordings to share their personal rap or song developments with outsiders (peers, parents and teachers).

Participants

All adolescents of Grade 8 of a public school (N = 180) in the Netherlands will be informed about this study. The head of school granted permission to ask parents for consent for data collection with their adolescents and to perform the research during school hours as part of a regular (music) program. Participants will be recruited by the researchers and the classroom teacher at De Lanteerne, a Jena-plan-school in Nijmegen, centered around the concept of community and learning through self-discovery. All participants will be boys and girls aged between 9 and 12 years old, as the Jena-plan-school includes different ages in one class. All participants will partake in the project of their own class during regular school hours. Two classes will receive external music instructions, therefore six out of the eight classes will participate in the RMT. No selection process for indication of behavior and/or developmental problems will be held beforehand, thus no child will be excluded from the music experience. Both adolescents with and without behavior and/or developmental delays will be included in the same study condition. Applied RMT is designed for these populations and ages with sufficient flexibility for therapeutic adjustments based on developmental levels and capacities of children. All parents of Grade 8 students will be informed about the study by verbal and written introductions explaining the content and procedures of this study. Parents consenting to data collection from their child will be required to sign informed consent forms for permission to participate and to allow audio and video recordings during the sessions. Standardized tests will be used at the beginning and end of the study for adolescents, parents and teachers participating in data collection. Adolescents partaking in the RMT without parental permission for data collection will not be tested nor interviewed.

Measurements and procedures

All participants will undergo two measurements: baseline measurements (start of the study) and post measurements (end of music intervention). The two measurements consist of three different assessments to investigate whether a change has occurred in an adolescent's emotional or behavioral functioning. Assessment of psychological well-being has three standardized written tests (A); assessment of cognitive function has one standardized written school test, and three tests of executive function using an iPad application (B); and assessment of rest–activity rhythm incorporates the use of Actiwatches, with which the sleep–wake patterns of participants can be recorded (C). The follow-up study will be performed by interviewing the experimental group (four months after intervention). Due to pilot study experiences, adjustments will be made to the follow-up study: a personal investigation of each individual participant is needed instead of a third "text-based-test" assessment. Assessing qualitatively seems to rely closer on participants' experience, whereas quantitative assessments were rated as "distant" by adolescents during their individual emotional experience of music. Through the interviews (D), we aim to present a qualitative inquiry of the "lived experience" of the adolescents and weave a complementary multi-methodical approach into the RCT. Psychological and iPad measurement tests will be combined in one session, with a duration of about 40–60 minutes (dependent on the participant). Trained students of the Clinical Neuropsychology master of the Vrije Universiteit Amsterdam will administer the tests and perform the interviews. During the weeks of the psychological testing (pre- and post-measurements), participants will wear an Actiwatch activity monitor for one week. Measurement methods A–D are elaborated upon below.

Primary outcome measures

Assessments of psychological well-being

A1. Emotion regulation: Difficulties in Emotion Regulation Scale (DERS) is designed to evaluate the functionality of emotion regulation (Gratz & Roemer, 2004). The DERS is used for adults, adolescents up to the age of 13, and will in this study be used with younger adolescents (9– 12), as recommended by Neumann, van Lier, Gratz and Koot (2009).

A2. Self-esteem: Self-perception Profile for Children (CBSK; Competentie Belevingsschaal voor kinderen) for children aged 8–11 years. Children's self-esteem will be measured to indicate their own self-perception (Treffers et al., 2004).

A3. Self-description: Strength and Difficulty Questionnaire (SDQ) to identify children's risk of psychiatric disorders, ages 4–16 years. The SDQ gives a description of the child's strengths and difficulties, including reports about parent and teacher SDQ, and will be used for the prevention of health problems in the youth population (Muris, Meesters, Eijkelenboom, & Vincken, 2004).

Assessment of cognitive functions

B1. Wechsler Intelligence tests for children: language development (WISC 4: Verbal Comprehension Index, VCI). Vocabulary: the examinee is asked to define a provided word. The verbal examination aims to investigate affiliations between music and language (Ettlinger, Margulis & Wong, 2011).

B2. Tower of London Test (TOL), to measure neuropsychological executive functions or problem-solving skills. This is a computerized planning test to research correlation between selfcontrol and executive function and music (Anderson, Anderson & Lajoie, 1996; Diamond & Lee, 2011).
B3. Trailmaking test (TMT), to measure neuropsychological executive functions or impairment in multiple cognitive domains. The Trail-Making Test is a measure for mental speed and mental flexibility. This is a computerized test, which aims to investigate the enhancement of executive function through music (Bialystok & DePape, 2009; Degé, Kubicek, & Schwarzer, 2011; Schellenberg, 2011).
B4. Stop test (ST) to measure neuropsychological executive functions of self-control, performance on cognitive tasks of inhibition, and working memory (Oosterlaan, Logan, & Sergeant, 1998). This is a computerized test, studying development of self-regulation skills through music (Winsler et al., 2011).
Assessment of rest–activity rhythm (Actiwatch). Actiwatch (AW 2), to test sleep wake pattern of participants. Actiwatches and sleep log information will be gathered over 5 consecutive days, using a sleep-monitoring device (Philips Actiwatch®, n.d.; Gaina, Sekine, Chen, Hamanishi, & Kagamimori, 2004). Investigation of Actiwatch data of children is important, because a good sleep is recuperative. In this way the correlation with cognitive problems, like inattention as well as emotional instability and impulsivity from shorter sleep duration, can be assessed (Gruber, Cassoff, Frenette, Wiebe, & Carrier, 2012). Furthermore, intensity and regulation of sleep problems (El-Sheikh & Buckhalt, 2005) and sleep duration and regularity associated with behavioral problems (Pesonen et al., 2010) can be studied. Analysis of sleep patterns include start, latency, end, time, and efficiency of sleep, and will be related to psychological testing, and for the first time related to music, as a non "text-based test," as Schellenberg (2011) has defined.

Secondary outcome measures

Interviews. A qualitative inquiry will be set up to collect information about "how" music affects adolescents, and their emotional reality as "lived music experience." Adolescents' participation will consist of accounts of their subjective experiences, yielding narrative data on the application of the intervention. Insight into what conditions are required for an effective application of intervention is useful information for refinement and further development of the intervention protocol (Hesse-Biber, 2012), as well as the detection of unexpected effects that otherwise go unnoticed.

Demographic and control variables

Demographic data information will be provided by parents, consisting of age, gender, marital status of parents and family structure, working status, parents' education, parents' interests and hobbies, family activities, and former music education. From the perspective of the outcome measures it will be investigated whether there are correlations with demographic and family circumstances for each child (Rescorla et al., 2007; Silk, Steinberg & Morris, 2003). To define whether an alteration has occurred in a child's emotional and behavioral functioning, several questions will be asked during the condition assignment to compare baseline with later test sessions and circumstances.

Statistical analysis

Statistical analysis will be performed on intention to treat (ITT) to preserve the sample size (Gupta, 2011) and to minimize uncontrolled covariates whose effects may be confounded with the intervention effect (Porta, Bonet & Cobo, 2007). Differences between the music and control group in the two sessions of measurements will be analyzed with a repeated-measures design. Differences between participants in school, class, time, age, and gender will be considered as within-between interaction variables. Measuring the possible effects of the RMT regarding effects on rest–activity rhythm, the analysis of the Actiwatch is constructed around the primary outcome of baseline measurements.

Sample size

The calculations for adequate sample sizes are based on the outcomes of the literature review on applied music intervention, resulting in a modest sample size of N = 90 for the first study of school adolescents (ages 9–12). In line with the literature review, no existing studies apply a music (therapeutic) intervention for emotion regulation in school settings. Primarily, measurements of music effects for emotion regulation purposes are based on verbal questionnaires without applied music interventions (Uhlig et al., 2013). Accordingly, our study calculates an effect size of f = 0.15, which is to be considered a small effect (Faul, Erdfelder, Lang & Buchner, 2007). For a required 80% power threshold, the estimated sample size requirement per group is 45, with two planned measurements. Anticipating dropout rates, the study population is targeted at 120 participants. The feasibility of a small effect size (f = 0.15) for the planned sample size, involving six school classes, allows for a reduced risk of Type II errors (Banerjee, Chitnis, Jadhav, Bhawalkar & Chaudhury, 2009).

Ethical and legal consideration

The study protocol has been reviewed and approved by the scientific and ethical review committee of the Vrije Universiteit Amsterdam (Vaste Commissie Wetenschap en Ethiek; VCWE), an independent advisory board of the Faculty of Psychology and Education. Ethical aspects of the protocol were approved and the study has been included in the research registration system of VCWE registration number 2500. VCWE registration and approval was sufficient, consequently no CCMO (Central Committee on Research Involving Human Subjects) or Medical Ethical Committee registration was required, which permits performing this research in a non-clinical school setting.

Discussion

The goal of the present study is to examine the effects of RMT on emotion regulation. The study focuses primarily on rap and singing for self-regulative purposes in a school-group setting: on the individualized motivation to express both joyful and uncomfortable feelings, which are sensitive to emotional and behavioral difficulties. Alongside this, the identification of personal and peer themes for coping or well-being and possible prevention purpose will be assessed. Typical peer themes of adolescents are bullying and victimization (harassment, teasing, bothering) as well as hidden and embarrassing feelings and thoughts about love and friendship (Olweus, 2003; Roede & Felix, 2009).

A secondary focus of the study is to contribute to development of "practice-based" and "evidence-based" methods; RMT assesses the effects of applied motivational usage of rap and singing interventions.

The strength of this study is the application of RMT for evaluation of its impact on shortterm effects of the self-regulative ability of adolescents (over 4 months). To our knowledge, the current study is the first offering an individualized focus on the under-represented subject of music and emotion regulation in a school group setting. This study brings music back into the classroom without high costs and individual encounters; rap and singing interventions do not require specific fine-motoric skill training, nor the use of expensive instruments. Also, the selfregulative ability for emotional and behavioral adaptation is assessed during a regular school activity in a typical peer environment.

Challenges of this study are the short RMT cycles of 45 minutes once a week over 4 months (16 sessions). Adolescents participate in extra-school activities (preparation for holidays or vacations) and due to absence from school, interference with music schedules may limit the number of sessions. Another concern is the diversity of the group in a school, representing realistic class conditions; this might influence outcomes. Possibly a small number of children with psychopathological or sensitive developmental patterns will participate, compared to children with normal progress. Some parents might not allow their child to participate in the study because of the risk of "over-testing." A central concern is the use of psychological tests, which should be approached with caution. Specialized, validated instruments are needed for the assessment of effects of the emotion regulative processes (Aldao, 2013; Gratz & Roemer, 2004), and the applied music interventions (Robb et al., 2011). Therefore, this study addresses Schellenberg's (2011) concern, as associations between music interventions and emotional (regulative) intelligence might not be evident from "text-based tests" of emotion regulation and "verbal intelligence."

In conclusion, the RMT is an innovative approach examining the possible benefits of rap and singing on emotion regulative processes, executive functions, and rest–activity rhythm monitoring. Results of the study are expected to contribute substantially to the application of music in classroom settings for dynamic regulative purposes, and to reflect on methods to study suitable tests/measures of music experiences. Use of standardized protocols, such as RMT, can make it easier to carry out future studies maintaining the comparability of results between studies. Lastly, this study protocol prior to analysis is well-regarded for use in RCT's, enabling readers to comprehend the characteristics and development of the investigation which are otherwise difficult to understand. It aims to elicit more attention and awareness for collaborations involving music, therapy, and education, by giving insight into what methods are applied in order to plan future investigations into music interventions in schools.

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Being a bully isn't very cool
If you like to bully,
you will look like a fool
Stop spreading hate
and instead lend a hand
This is what the world
should start to understand[13]

[13] Example of a personal expression of adolescents' concern, worrying about bullying, by voicing his wishes for the world around him. His transformed feelings and thoughts were woven into some rap lyrics during the performed Rap & Sing Music Therapy of this study (translation from Dutch: Pesten is niet leuk. Pesten moet je kappen. Dat is wat de hele wereld moet snappen!)

Chapter 4

Being a bully isn't very cool…": Rap & Sing Music Therapy for enhanced emotional self-regulation in an adolescent school setting – a randomized controlled trial

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Abstract

Music as an effective self-regulative tool for emotions and behavioural adaptation for adolescents might enhance emotion-related skills when applied as a therapeutic school intervention. This study investigated Rap & Sing Music Therapy in a school-based programme, to support self-regulative abilities for well-being. One-hundred-and-ninety adolescents in grade 8 of a public school in the Netherlands were randomly assigned to an experimental group involving Rap & Sing Music Therapy or a control group. Both interventions were applied to six classes once a week during four months. Measurements at baseline and again after four months provided outcome data of adolescents' psychological well-being, self-description, self-esteem and emotion regulation. Significant differences between groups on the SDQ teacher test indicated a stabilized Rap & Sing Music Therapy group, as opposed to increased problems in the control group ($p = .001$; $\eta p = .132$). Total problem scores of all tests indicated significant improvements in the Rap & Sing Music Therapy group. The RCT results imply overall benefits of Rap & Sing Music Therapy in a school setting. There were improved effects on all measures – as they are in line with school interventions of motivational engagement in behavioural, emotional and social themes – a promising result.

Introduction

The growing population of adolescents (age 10–19, WHO, n.d.) with identified emotional problems and anti-social behaviour calls for effective interventions as well as for prevention of problem behaviours (NCSE, 2015; Stockings et al., 2016; Suveg, Sood, Comer, & Kendall, 2009). In the Netherlands, 22% of adolescents (aged 8–12) have psychosocial problems: 15% experience emotional and behavioural problems, and 7% experience severe problems (Diepenmaat, Eijsden, Janssen, Loomans, & Stone, 2014). This population suffers from violence, abuse and neglect in parental and social environments, which are typical potential sources for the development of psychopathological behaviour (van Dam, Nijhof, Scholte, & Veerman, 2010). Reported backgrounds for the development of psychopathological behaviour among at-risk youth reveal a high manifestation of (un-)diagnosed mental health problems and trauma (van Dam et al., 2010). Studies from the United Kingdom and the United States support these findings. The Health Behaviour of School-Aged Children Survey (HBSC) has found that around 22% of English adolescents have self-harmed themselves, and that those rates have increased over the past decade, and indicate a possible rise in mental health problems among young people (HBSC, 2017). A large US study (N = 10,123) reports that one in every four or five adolescents has a mental health disorder. The prevalence of disorders is classified as follows: anxiety disorder (31.0%) represents the biggest group, followed by behaviour disorders (19.1%), mood disorders (14.3%) and substance use disorder (11.4%; Merikangas et al., 2010). Moreover, each additional type of trauma or exposure to trauma significantly increases these percentages for each problem (Layne et al., 2014). Also, a rapid rate of decline in the academic achievement of troubled mental health students (N = 300) is described in a study by Suldo, Thalji, and Ferron (2011), correlating well-being with psycho-pathology in middle school.

School experiences are crucial to the development of self-esteem, self-perception and health behaviour, as shown in a large study of 42 countries across Europe and North America (Inchley et al., 2016). Schools need to support young people's well-being through positive engagements for better health outcomes, for example, providing buffers against negative health behaviours and outcomes (Inchley et al., 2016). Thus, school interventions are desired to help direct and control attention and behavioural impulses (like reacting to teasing from others) as the primary sources of difficulties related to problems with (emotional) self-regulation (Blair & Diamond, 2008; Boekaerts, Maes, &

Karoly, 2005; Gestsdóttir & Lerner, 2007; Karoly, 2012; Kovacs, Joormann, & Gotlib, 2008; Raver, 2004; Vohs & Baumeister, 2011). Difficulties in emotion regulation capacities are reported by clinical studies of patients with Oppositional Defiant Disorder/Conduct Disorder, (comor- bid) behavioural difficulties, childhood depression, Borderline Personality Disorder and anorexia, caused by stress, traumatic experiences and family dysfunction (Suveg et al., 2009). To support well-being, these regulative capacities are necessary for dynamic and reorganizational processes of emotional and behavioural adaptation (Blair & Diamond, 2008; Crocker, 2002; Diamond & Lee, 2011). Self-regulation is a complex process of self-directed change and serves as a "key-adaption of humans" for management of cognitive, emotional, behavioural and physiological levels (Baumeister, Schmeichel, & Voh, 2007; Karoly, 2012; Moore, 2013).

Music and Rap & Sing Music Therapy (Rap&SingMT)

Music, whatever its style, might be able to modulate some of these levels through its non-threatening sensory information (Moore, 2013), and its rewarding and emotionally evocative nature (Patel, 2011). Music induces a complex cognitive-emotional process, interacts with brain areas that modulate mood and stress (Janata & Grafton, 2003; Koelsch, 2011; Molinari, Leggio, & Thaut, 2007; Stegemann, 2013) and enhances contact, coordination and cooperation with others (Koelsch et al., 2013). Instrumental and vocal music involves multiple neural networks, and singing intensifies the activity of the right hemisphere during production of words in song in a different way from speaking (Jeffries, Fritz, & Braun, 2003), whereas regular vocalization helps to increase the connectedness between syllables and words (Wan & Schlaug, 2010). Combining instrumental music, singing and vocalizations, Rap (Rhythm And Poetry), with its rhymed couplets to an insistent beat, vocally expresses primary emotions and transforms them into words (Uhlig, 2011b). Altering those primary emotions – which are spontaneously uttered – into secondary emotions, after conscious or unconscious judgment about the first (Shaver, Schwartz, Kirson, & O'Connor, 1987), can result in the development of a mindful maturation process. The rationale underlying Rap&SingMT is built on those vocalizations – whether rhythmical speech in rap, or melodic lines in singing – and based on a predictable rhythmic pattern, to stabilize or modulate positive and negative emotions. This functions as a safe "bridge" between talking and singing: rhythm can structure one's ability to synchronize to an external beat – a human capacity (Koelsch, 2015) – and might stimulate the brain by integrating and organizing

sensations. Singing can involve a greater emotional component in the brain than speaking (Callan, Kawato, Parsons, & Turner, 2007; Leins, Spintge, & Thaut, 2009), which may be essential for the development of sensitivity and processes of learning. Vocal engagement, supported by rhythmic clapping, stamping, dancing or moving the body, invites participants to develop emotional, social and physical cooperation and to strengthen group cohesion (Hallam, 2010; Koelsch et al., 2013). To practise these basic skills of rapping and singing in a large group, no instruments are needed, as a transportable workstation and recording equipment are carried into the classrooms.

Clinical cases of music therapists report on the beneficial use of rap and singing interventions for self-regulation, development of coping strategies and behavioural changes for adolescents and youth (Ahmadi & Oosthuizen, 2012; Donnenwerth, 2012; Ierardi & Jenkins, 2012; Lightstone, 2012; MacDonald & Viega, 2012; McFerran, 2012; Travis, 2013; Viega, 2013, 2015). The purpose of music therapy is to stabilize, reduce or enhance individual difficulties, while engaged in the music process during the expression of personally preferred music styles, like rap, in youth (Uhlig, Dimitriadis, Hakvoort, & Scherder, 2016). This is different from the use of rap in school counselling, as it was first introduced by Elligan (Gonzalez & Hayes 2009; Travis & Deepak, 2011). Hadley and Yancy (2011) present an overview of cases of adverse experiences with difficult-to-engage adolescents and youth, and their ability for emotional transformation through rap. Even though rap music has a negative connotation for some people, destined to manipulate youth with its strong emotional expressions with strong language and violence, some might have missed rap's cultural messages and marginalized its political critiques (Cundiff, 2013; Oden, 2015). Many rappers express non-violent but authentic messages about their grief, community distress or true feelings of loss, whereas record companies demand mostly offensive lyrics for their own profitable goals (Oware, 2011). Authors of the British "Hip Hop Psych" (2014) website, a psychiatrist and neuroscientist, have argued for further investigation on engaging in these authentic messages and linking rap music and culture with health to empower hip-hop as a prospective therapy. In the Netherlands, a music style called "Nederhop" (using the Dutch language as equivalent for spoken English hip-hop), developed as an easily understandable popular music of different ethnicities (Pennycook, 2007). Rappers of white or diverse colours perform Nederhop rap styles – not a mainstream musical culture in the Netherlands – while addressing serious, uncomfortable or humorous themes. These practices are also used in Dutch music therapy sessions as a valid tool of empowerment for youth and

adults (Hakvoort, 2008, 2015). The forthcoming themes and messages will be discussed while using rap and hip-hop in therapy, nonetheless, they provide a "funky discourse" and cultural dialogue about these subjects, as Viega (2015) points out.

The present randomized controlled trial (RCT) reports on the first application of Rap&SingMT in a regular school setting in the Netherlands to support the enhancement of emotional well- being. It aims to encourage the expression of "true feelings" (Short, 2013) of adolescents within a therapeutic context, and allows music therapists early involvement in schools. It provides music therapeutic support in various educational settings, enables individual sessions after this group project, and permits ongoing engagement with teachers and parents. It aims to examine the effect of Rap&SingMT for emotion regulation by the development of self-regulative skills for modulation of positive and negative feelings, and to strengthen perception and description of the self, as well as adolescents' self-esteem. The null hypothesis is that there will be no difference observed between the two assessed groups. Rejection of the null hypothesis would involve adolescents who participated in Rap&SingMT having a greater improvement in measures of emotional and behavioural symptoms, supporting their well-being, than those who did not take this intervention (Uhlig, Jansen, & Scherder, 2015).

Methods

Design

This RCT with adolescents in a public school used therapeutic rap and singing interventions as support for emotional and behavioural self-regulation to compare its effects with the control group. The Consolidated Standard of Reporting Trials (CONSORT) is applied and presented in Figure 1.

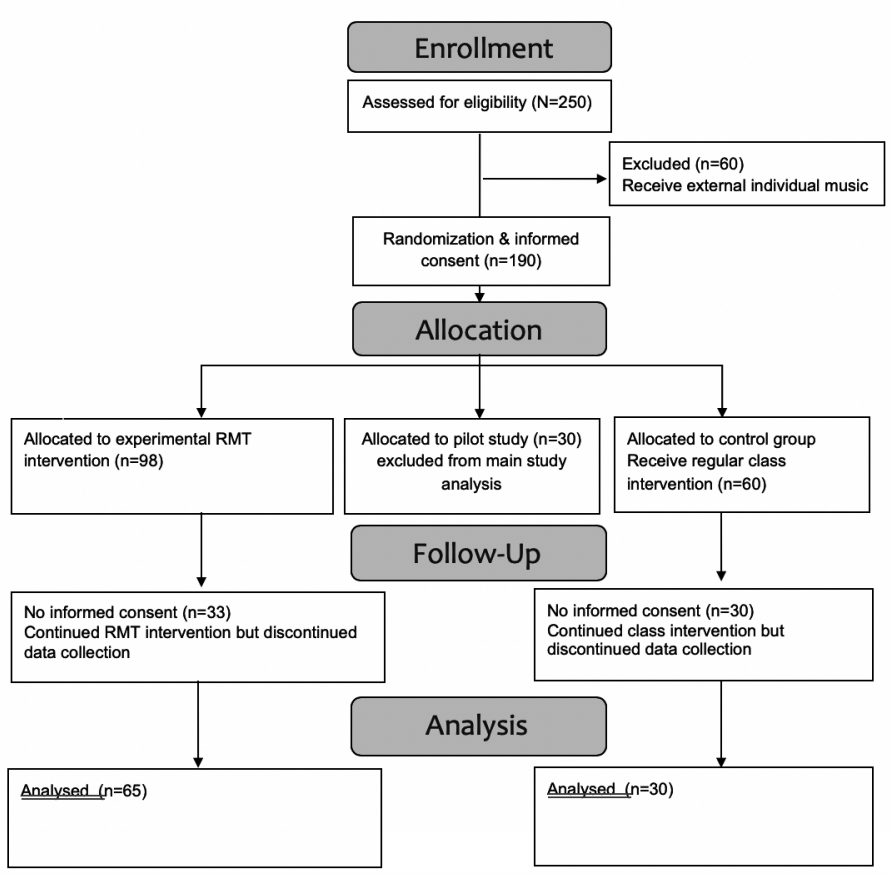

Figure 1. Flow Diagram Randomized Controlled Trail of RMT

Participants

One-hundred-and-ninety Dutch-speaking adolescents in grade 8 were recruited at De Lanteerne, a public Jena plan school in Nijmegen, the Netherlands. The Jena School system is centred around concepts of learning within a community, so that different age groups in one class engage together in dialogue, play and celebrations. Participants were boys and girls, aged between 8 and 12, partaking in the project with their own class during regular school hours. No adolescent was excluded, and no pre-screening for special needs conditions was applied. Adolescents with and without behavioural and/or developmental delays were included in the same study condition. Adolescents without parental/caregivers' permission for data collection were not tested but participated in both group (music + control) interventions. Control groups were informed about their control status, their exclusion from music data and their postponed Rap&SingMT sessions. Six out of the eight classes participated in the Rap&SingMT, while two classes were excluded from this research because of participation in an external individual music programme. Demographic data was provided by parents, consisting of age, gender, marital status of parents and family structure, parents' working status, parents' education, parents' interests and hobbies, family activities and former music education of parents and adolescents.

Randomization

All adolescents from the remaining six classes were randomly assigned for participation in the Rap&SingMT: three classes in experimental groups, two classes in control groups and one class participated in a pilot study and was therefore excluded from the main study. Pilot, experimental and control groups were selected blindly by an independent researcher at VU University Amsterdam. Qualified music therapists, a researcher and assistants were blind to information about the adolescents' school records, behaviour problems, difficulties and diagnoses, as well as which adolescents actually partook in data collection. Music therapists worked with the adolescents in the classrooms, but did not participate in the testing. Research assistants performed testing after music and control group interventions, but without information about who participated in which group. Two teachers per classroom randomly filled in questionnaires about adolescents' behaviour without knowing if they participated in data collection or not.

Sample size

Calculations for adequate sample sizes were based on the outcomes of the literature review, which demonstrated limited applied music intervention. Most measurements of music effects for emotion regulation purposes were based on verbal questionnaires without applied music interventions (Uhlig, Jaschke, & Scherder, 2013). This resulted in a modest sample size of N = 190 for the first study of applied music (therapeutic) interventions for emotion regulation in a school setting for adolescents (ages 8–12). So, our calculation of an effect size of Cohen's f = 0.15 is to be considered a small effect (Faul, Erdfelder, Lang, & Buchner, 2007). For a required 80% power threshold, the estimated sample size required per group is 45 participants, with two planned measurements. Anticipating dropout rates, the study population was targeted at 190 participants. The feasibility of a small effect size (Cohen's f = 0.15) of the planned sample size, involving six school classes, reduced the risk of Type II errors (Banerjee, Chitnis, Jadhav, Bhawalkar, & Chaudhury, 2009).

Ethics

The study was approved by the scientific and ethical review committee of the Vrije Universiteit Amsterdam (Vaste Commissie Wetenschap en Ethiek, VCWE: Scientific and Ethical Review Board). The head of the Jena plan school granted permission to perform Rap&SingMT during school hours. Prior to research activities, parents received information about the study and signed different informed consent forms regarding participation, and audio/video recordings of the Rap&SingMT sessions.

Materials and procedure

Standardized tests were used as a pre- and post-measure for adolescents, their parents and teachers, participating in data collection. Adolescents partaking in the Rap&SingMT without parental permission for data collection were neither tested nor interviewed. All participants of the RCT underwent two primary outcome measurements, pre-and post-intervention, respectively. The two measurements consisted of a composite of three assessments of psychological well-being (paper tests). The two assessments were administered by trained Master's students in Clinical Neuropsychology of the VU University Amsterdam, and took about 30–40 minutes, depending on the participant. The researchers guided and monitored adolescents during the two periods of group data collection at school over the course of six months.

Main outcome measures

Primary outcomes. Psychological well-being was assessed by measures of self-description: Strength and Difficulty Questionnaire (SDQ), function of emotion regulation: Difficulties Emotion Regulation Scale (DERS) and evaluation of Self-esteem: Self-Perception Profile Children (SPPC).

Secondary outcomes. A qualitative inquiry investigated about "how" music affected adolescents, and their emotional reality as `lived music experience', by performing interviews.

Self-description: Strength and Difficulty Questionnaire (SDQ). The SDQ identifies a young person's risk for psychiatric disorders (ages 4–16 years), and describes the person's strengths and difficulties. Three different SDQ versions, the self-report of the adolescent and the informant-rated version, completed, respectively, by a parent and a teacher, provided information about health for the purpose of anticipation and prevention (Muris, Meesters, Eijkelenboom, & Vincken, 2004). The teacher version of the SDQ had been tested in Dutch schools as a valid instrument with satisfactory and good internal consistency, and as an indicator of emotional and social problems (Diepenmaat et al., 2014). SDQ is a 25-item questionnaire, assessing psychosocial traits on a 3-point scale ranging from 0 = not true, 1 = somewhat true, to 2 = certainly true. The items lead to five scores on the following scales: emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and prosocial behaviour. A "total problem score" is created, ranging from 0 to 40, by summing 20 item scores of the four problem scales, without the prosocial item. A defined cut-off score higher than 14 for "total problem score" rated by teachers indicated an adolescent being at heightened risk for developing mental health problems. In this study, defined Dutch cut-off scores for genders were used (14 for boys and 12 for girls), as well as "borderline" states (10 for boys and 8 for girls) as described by Diepenmaat et al. (2014).

Emotion regulation: Difficulties in Emotion Regulation Scale (DERS). The DERS evaluates the functionality of emotion regulation at different ages (Gratz & Roemer, 2004; Neumann, van Lier, Gratz, & Koot, 2009; Weinberg & Klonsky, 2009). DERS is recommended as a useful emotion regulation (ER) scale for youth, emphasizing negative emotions. Its scores and subscales are associated with behavioural, neurological and experimental measures (Neumann et al., 2009). In this study, DERS was applied for adolescents (aged 8–12) in the Dutch translation of 32 items. DERS has a Flesch-Kincaid Grade Level of 5.3, so an average fifth-grader should be able to understand and fill in the questionnaire (Neumann et al., 2009). DERS internal consistency within (non) clinical populations has been found to be comparable between adults and adolescents as well as having convergent and predictive validity (Gratz & Roemer, 2004; Neumann et al., 2009). The six scales of the Dutch DERS self-report questionnaire (32 items) are as follows: lack of emotional awareness, lack of emotional clarity, difficulties controlling impulsive behaviours when distressed, difficulties engaging in goal-directed behaviour when distressed, non-acceptance of negative emotional responses, and limited access to effective ER strategies. Each item was scored on a 5-point scale, ranging from 1 (almost never) to 5 (almost always). Higher scores suggest higher problems in emotion regulation, and a "total problem score" aggregates the six scales.

Self-esteem: Self-perception Profile for Children (SPPC; Dutch version CBSK: Competentie Belevingsschaal voor kinderen). SPPC for children and adolescents (aged 8–12 years) measures self- esteem to indicate their own self-perception (Treffers et al., 2004). Analyses about correlation between self-esteem and depression, anxiety and externalizing problems, suggest that measures of increased self-esteem reduced these vulnerabilities (Donnellan, Trzesniewski, Robins, Moffitt, & Caspi, 2005; Sowislo & Orth, 2013). The reliability of the SPPC is satisfactory with good internal consistency and test–retest stability and obtained validity for self-esteem (Muris, Meesters, & Fijen, 2003). The Dutch CBSK version of SPPC was translated and evaluated for Dutch samples by Veerman (1989). SPPC consists of 36 items distributed across six scales with five domain-specific subscales: scholastic competence, social acceptance, athletic competence, physical appearance, behavioural conduct and one global measure of self-worth. Each scale measured six items and consisted of two opposite (left/right) descriptions. The adolescents chose the best fitting answer for themselves and marked that with "really true" or "sort of true". Responses represent low perceived competence scores of 1 or 2, and high scores of 3 or 4. For each of the self-esteem domains and the global self-worth scale, a total score is computed by summing relevant items (Muris et al., 2003).

Intervention

The RCT study employed an estimated 16 sessions of 45 minutes per week, over a period of four months. The Rap&SingMT intervention and the regular activities for the control group were designed for large groups of 30 adolescents per class. Ninety-eight adolescents, divided into three classes, underwent Rap&SingMT, and 60 adolescents, divided into two classes received regular classes. The Rap&SingMT group received music instructions by trained music therapists and control groups received instruction by regular classroom

teachers, both during 45 minutes per week of school time. The Rap&SingMT was applied by two music therapists, working together during eight weeks in one class. After this the classes were split into subgroups of 2 × 15 adolescents, and each group continued with one therapist for the next eight weeks. In Rap&SingMT participants worked on specific group and individual themes, and prepared for audio and video recordings of individual and group rap-songs. Regular class interventions were performed "as intervention as usual" by two classroom teachers. Teachers worked on self-decided school themes and goals with students (subjects varied strongly, e.g. language, mathematics, physical activity, art) within multiage sub-groups. The qualified music therapists were trained prior to performance of the Rap&Sing MT, and underwent supervision and evaluation sessions provided by the first author during the entire research. The classroom teachers participated in regular team meetings at the Jena plan school. Music therapists, researchers and assistants were involved in school team meetings only during organizational arrangements with teachers and school management, in which the development of the adolescents was not discussed.

Rap&SingMusicTherapy protocol

The Rap&SingMT protocol was applied to stimulate regulative emotional processing, as it is constructed around components of Cognitive Behavioural Therapy (CBT), which involve feelings, thoughts, behaviours and physiology, and elements of psycho-education. Rap&SingMT employed a therapeutic structure, facilitated the overall expression of "true" feelings (Short, 2013) and offered a route for the modulation of emotions, especially negative ones (e.g. anxiety, sadness and anger), as these are often difficult to inflect (Suveg et al., 2009). Rap&SingMT is based on three elements of music: (1) rhythm, (2) vocal expression of singing and rapping, and (3) development of word rhyme for song lyrics (Uhlig et al., 2015). These elements were applied:

1. Effective rhythmic engagement to synchronize emotional expression to an external beat, and (to) affect sensory coordination (Koelsch, 2015; Thaut, 2013), (to promote) group cohesion and cooperation (Phillips-Silver, Aktipis, & Bryant, 2010). To induce the rhythmic patterns, programmed loops and body-percussion were used to combine visual and physical expressions and to encourage synchronization processes (physiology). By repeating the rhythmic patterns, adjusting tempi and dynamics, predictability was enhanced to facilitate a grounding pattern for group stability.
2. Singing and rapping were used as pleasurable activities, to involve a greater emotional engagement of the brain (Callan, Tsytsarev, Hanakawa, & Callan, 2006) and to induce mood changes (feelings). Rapping, singing and repeating vocal sounds of the group encouraged development of dialogues and contained feelings.
3. Vocalizations, linking syllables and words, chunked into rhyme and lyrics, encouraged learning through songs (Leins et al., 2009). To enhance self-esteem by accepting (negative and positive) lyrics, problem-solving skills were behaviourally trained and destructive feelings modulated or reduced. A large number of downloaded samples and loops with different rap-song styles (e.g. aggressive, easygoing or lyrical) were offered and discussed as an invitation for improvisation and self-experiment. Individual lyric/poem writing was stimulated by applying a fill-in-the-blank technique, and motivated word recall and further reflection about therapy relevance (thoughts).

Rap&SingMT interventions were applied to increase the individual awareness of emotional states and behaviours, and to stimulate empathy and decision making within the group. For transfer of group experiences, video recordings were made to share rap songs with outsiders (peers, parents and teachers). An emotional and social encounter was created for reappraisal of emotion regulation strategies by reflectively discussing the recordings in the classroom.

Statistical analysis

Statistical analysis was performed with SPSS 23 (IBM Corporation 2015), and level of significance was set at $p < .05$. Analysis was based on intention to treat (ITT) to preserve the sample size and to minimize missing outcome data (Gupta, 2011). The chosen paper tests offered a controlled test environment, and provided a technical error-free condition and minimalized missing values. Due to the pleasurable nature of the music activities, dropout rates and missing data could be limited. A non-parametric test was used to compare Rap&SingMT and control groups (Mann-Whitney U test). Differences between participants in school, classes, parental conditions, ages and sexes were considered as within–between interaction variables. To define whether a change has occurred in an adolescent's emotional and behavioural functioning, several items were compared with baseline and later test moments. Differences between the Rap&SingMT and control groups in the two measurements were analysed with a repeated-measures ANOVA. General linear model (GLM) multivariate ANOVAs

were used for analysis of pre- and post-intervention scores and conditions. One-way ANOVA was used to collect test summaries and sub-scales as within-subjects variables to compare with the between-subjects factor. Time functioned as an independent variable and represented the measurement for Rap&SingMT (pre/post). To minimize uncontrolled covariates whose effects may be confounded with the intervention effect (Porta, Bonet, & Cobo, 2007), ANCOVA (analysis of covariance) was applied as an extension of the employed one-way ANOVA, and to determine whether there were significant differences between the means of two or more independent (unrelated) groups. Univariate analyses compared dependent variables of post- with pre-measures as covariates, whereby fixed factors were used to analyse both groups. Significant group interactions were further explored with pairwise group comparisons to locate group differences. The main effect measures of time and interactions between groups are reported as mean differences of 95% confidence interval. Partial eta-squared (ηp) was used to estimate small (.010), medium (.060) and large (.140) effects (Cohen, 1988). Pearson correlations were calculated between the different demographic variables and baseline SDQ teacher total scores. The outcome measures investigated whether there were correlations with demographic and family circumstances for each adolescent and between groups (Silk, Steinberg, & Morris, 2003; Rescorla et al., 2007). Also, to test if correlations coefficients contrasted between groups, z-scores and paired samples t-tests were applied to compare the scores of both, as described in Cohen, Cohen, West, and Aiken (2013).

Results

Table 1.

Demographic baseline data	RMT group N=65		Control group n=30		Between group difference	
	M	SD	M	SD	F	P
Age (8-13 years)	10.17	1.245	10.37	.765	12.35	Ns
Gender (40 boys/55 girls)	1.52	.503	1.70	.466	11.40	Ns
Family conditions home (single/ married/kids)	2.69	.732	2.47	.730	.520	Ns
Education parents (elementary/ college/ higher education)	3.66	.761	3.50	.777	1.064	Ns
Music education parents (years/ instruments)	3.95	4.87	4.18	6.25	.795	Ns
Music education adolescents (years/ instruments)	1.02	1.28	.853	1.09	.118	Ns
Problems SDQ score teacher pre-test	4.06	4.29	4.17	4.60	.000	Ns

Group characteristic demographics of Rap&SingMT and Control group (t-test).

Demographics

No significant differences were found between the Rap&SingMT and control group on conditions of age, gender, family conditions, parents' education, music education parents/adolescents and percentage of adolescents with or without problems (applied SDQ teacher tests), as presented in Table 1. Also, a Mann-Whitney U test demonstrated equal group conditions, whereas the different Z-scores indicate dissimilarity between pre- (Z = -0.53) and post-measures (Z = 2.227). No significant difference between group conditions (SDQ teacher test) was found in pre-measures (U = 968, p = .958). Treatment effects were therefore not dependent on their pre-measures.

Table 2.

	RMT Experimental Group n=65				Control group n=30				Within-between group differences			
Tests total scores	**Pre**		**Post**		**Pre**		**Post**		**F**	**Df**	**p**	**n2**
	M	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**				
SDQ T Total	**4.06**	**4.29**	**4.03**	**4.25**	**4.17**	**4.60**	**6.33**	**5.06**	**14.13**	**1**	**.001**	**.132**
SDQ P Total	6.82	5.71	5.69	4.59	6.43	4.35	6.20	4.14	.341	1	.137	.024
SDQ K Total	10.89	6.14	9.34	5.41	11.50	5.62	9.23	4.89	.002	1	.963	.000
DERS K Total	74.22	27.46	67.08	22.46	68.73	18.04	66.57	18.21	1.38	1	.243	.015
SPPC K Total*	107.46	16.38	109.93	14.64	110.46	11.52	111.26	11.78	.123	1	.726	.001

Effects of assessments on psychological well-being: Test total scores of pre/post-measures (ANOVA). Note. *Increase=positive improvement. GLM, general linear model; ANOVA, repeated measures, multivariate analysis of variance; SDQ: Strength Difficulty Questionnaire (T=teacher, P=parents, K=kids=children); DERS: Difficulty Emotion Regulation (children); SPPC: Self-Perception Profile Children and self-esteem (children).

Intervention Between subjects. In Table 2, results of the SDQ teacher test (SDQ T Total) showed a significant difference between groups (p = .001). The mean scores indicate that the Rap&SingMT group score did not change over time whereas in the control group mean scores of problems increased. Two of the four problem scales, emotional symptoms (E) and hyperactivity/inattention (H) presented significant scores in groups between pre-and post-intervention measures as well as large and moderate effect sizes (E: p = .001, ηp2 = .107; H: p = .01, ηp2 = .069), favouring the Rap&SingMT group (See Table 3, Figure 2).

Table 3.

	RMT Experimental Group n=65				Control group n=30				Within-between group differences			
Tests Subscales SDQ	**Pre**		**Post**		**Pre**		**Post**		**F**	**Df**	**p**	**n2**
SDQ T= Teacher	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**				
SDQ TE	**1.06**	**1.68**	**.91**	**1.51**	**.87**	**1.30**	**1.60**	**1.868**	**11.18**	**1**	**.001**	**.107**
SDQ TC	.26	.871	.22	.838	.17	.379	.23	.430	.742	1	.391	.008
SDQ TH	**2.25**	**2.59**	**2.42**	**2.77**	**2.30**	**2.42**	**3.43**	**3.115**	**12.52**	**1**	**.010**	**.069**
SDQ TPP	.49	1.03	.49	1.03	.49	1.03	1.07	1.484	1.34	1	.249	.014
SDQ TPS*	9.02	1.57	9.18	1.33	9.03	1.65	9.27	1.112	.067	1	.796	.001

Effect on subscales Strength Difficulty Questionnaire (SDQ teacher): Test total scores of pre- and post-measures (ANOVA). Note. *Increase = positive improvement. SDQ: Strength Difficulty Questionnaire; T: teacher; E: Emotional symptoms, C: Conduct problems, H: Hyperactivity/inattention, PP: Peer relationship problems, PS: Pro-Social behaviour.

The SDQ-Parents measure (SDQ P Total) showed a non-significant but greater permanence of problems in the control group. The SDQ-Children (SDQ K Total) results were not significant. Further, the total scores for DERS yielded greater permanence of problems in emotion regulation within the control condition, with a significant difference on the subscale "difficulty engaging in goal-directed behaviour when distressed" (p = .025) with a moderate effect size of ηp2 = .053 in favour of the Rap&SingMT intervention. Total scores of SPPC for self-perception were not significant, only subscale "Global Self-worth" revealed a moderate increased effect size (ηp2= .031) for the Rap&SingMT group. Inspection of univariate tests with Bonferroni adjustment (α = .005) revealed no individual dependent variables that significantly contributed to the interaction in the model (See Table 4).

Table 4.

	RMT Experimental Group n=65				Control group n=30				Within-between group differences			
Tests Subscales DERS	Pre		Post		Pre		Post		F	Df	p	n2
DERS EA	15.88	5.70	15.77	5.68	16.13	4.71	16.40	4.29	.152	1	.698	.002
DERS EC	9.74	4.91	9.32	4.16	9.60	3.67	9.10	3.69	.009	1	.923	.000
DERS IC	11.22	6.32	9.88	5.15	8.87	3.56	8.93	4.33	1.54	1	.218	.016
DERS GB	**11.69**	**5.69**	**9.69**	**5.07**	**10.47**	**4.50**	**10.90**	**4.22**	**5.16**	**1**	**.025**	**.053**
DERS ER	11.32	5.88	10.03	4.76	10.40	5.75	8.93	4.53	.28	1	.867	.000
DERS ES	14.37	8.05	12.38	6.08	13.27	6.61	12.30	5.33	.460	1	.499	.005

Effect on subscales Difficulty Emotion Regulation (DERS): Test total scores of pre- and post- measures (ANOVA). Note. EA = Lack of Emotional Awareness; EC = Lack of Emotional Clarity; IC = Difficulty Controlling Impulse Behaviour when Distressed; GB = Difficulties Engaging in Goal-Directed Behaviour when Distressed; ER = Non-acceptance of Negative Response; ES = Limited Access to Effective ER Strategies.

Table 5.

	RMT Experimental Group n=65				T-test			Control group n=30				T-test		
	M	SD	M	SD	T	DF	p	M	SD	M	SD	T	DF	p
Total problem tests	**95.99**	**38.04**	**86.14**	**30.63**	**3.14**	**64**	**.004**	**90.83**	**26.02**	**88.33**	**25.24**	**.77**	**29**	**.45**

Total problem scores of all tests, comparing groups (t-test).

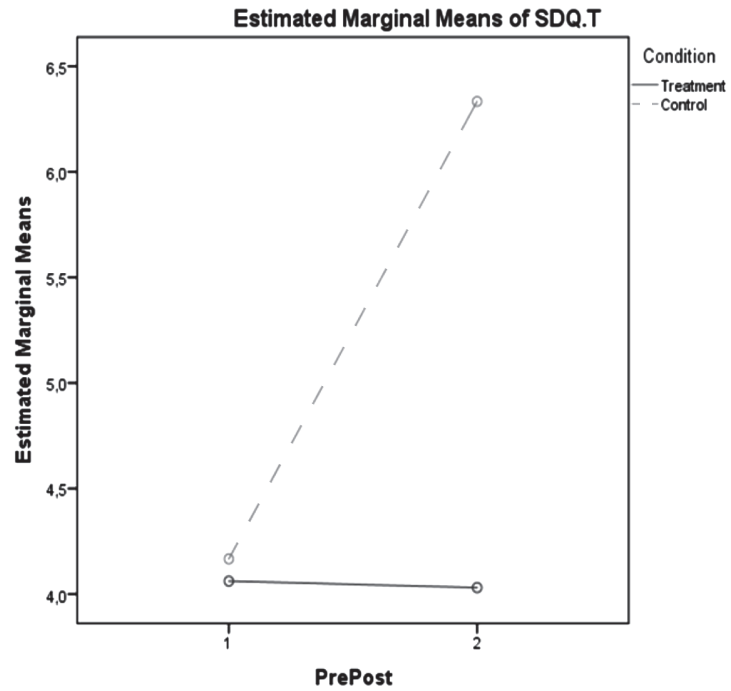

Figure 2. Pre- and post-intervention measures of SDQ Teacher problem scores for the treatment and control groups

Within subjects

In Table 5, also analysed data within each group separately. Results of assessed problem scores (SDQ T, SDQ P, SDQ K, DERS) were summed into one total "problem" score. Within the subjects of the Rap&SingMT group, a paired samples t-test showed that the problem scores declined significantly from pre-treatment (M = 95.99, SD = 38.04) to post-treatment (M = 86.14, SD = 30.63, t(64) = 3.14, p <.004). Within the subjects of the control group the decline in scores from pre-treatment (M = 90.83, SD = 26.02) to post-treatment (M = 88.33, SD = 25.24) was not significant, t(29) = .77, p < .45.

Interviews. The subjective experiences of adolescents yielded narrative data, collected by interviews and analyzed in a qualitative coding system of ATLAS.ti (not presented here). The results show, that the main experience of the adolescents about Rap&SingMT was positive - they generally interpreted it as an 'outlet', and learned to be more "engaged in their emotions", developed "self-knowledge", "voiced their emotions into words", and "were free to speak out".

Discussion

Our study aimed to examine whether Rap&SingMT had a beneficial influence on adolescents, in support of their well-being, and successfully rejected the null hypothesis. The purpose of Rap&SingMT was to strengthen self-perception and self-description as well as self-esteem by the development of self-regulative skills for modulation of positive and negative feelings. We compared the effects of Rap&SingMT with a school "intervention as usual" and found significant increases in the level of problems of the control group on SDQ total Teacher score, on subscales for "emotional symptoms", "hyperactivity/inattention", and on the DERS subscale of "difficulty engaging in goal-directed behaviour when distressed". The total problem scores of SDQ Parents, SDQ Children and the self-esteem scores of SPPC did not show significant changes. Finally, the total "problem" score of all tests showed a significant decline in the Rap&SingMT group during the treatment period whereas during the same period the control group remained level.

Nevertheless, all the test results revealed increased problems and decreased measures of self- esteem in the control group, as judged by the differences in the medians of the two groups. In contrast, we did not find the same negative changes in the Rap&SingMT intervention group. This is in line with other school interventions for motivational, behavioural, emotional and social engagement. These studies also observed stabilization of behaviours and limited problems, even when completed by children with psychiatric patterns (Breeman et al., 2015) or unmotivated adolescents (Lambie, 2004). In terms of the presence/absence of psychiatric or psychosocial problems, the effect of engaging interventions on stabilizing behaviour and limited problems was similar in those studies. Rap&SingMT results look promising for several (non) problematic behaviours, and a possible explanation for this finding might be the engagement in behavioural, emotional and social themes, like addressing the "true" feelings of adolescents. Further, in the analysis we differentiated for effects on psychosocial problems of adolescents (SDQ teacher score as indicator for problems), but the participant group yielded 6% fewer problems than the Dutch average (eight adolescents in each group). Therefore, the requirements for statistical power were not met and this analysis was not pursued further. Consequently, the defined problem score of the Strength and Difficulty Questionnaire of teachers was powerless as a group measure for our school, and our study pertained to heterogeneous groups of adolescents, defined as "with and without problems" as usual in schools.

Moreover, assessing adolescents at the end of the school year, especially just before the vacation can mean students of all ages and capacities are typically progressively restless and distracted in their behaviours (Oliver & Reschly, 2007). High levels of misconduct of students and time pressure for teachers before and after vacation are positively related to an increase of emotional exhaustion in both (Kühnel & Sonnentag, 2011). School interventions for motivational engagement, like Rap&SingMT, seem particularly appropriate as pleasurable, nourishing and evocative activities at this time of the year, even with challenging themes and discourses. On the other hand, performing the paper assessments after this music intervention, starting in February and finalizing them just before vacation in July, was likely associated with exhaustion. Correlations with well-being in schools show a decline in academic achievement with troubled mental health for all students (Suldo et al., 2011). Therefore, a small improvement of emotional and hyperactive symptoms during distress, such as that achieved in this study, might stabilize these vulnerabilities. Also, Rap&SingMT used cognitive restructuring strategies and involvement in positive and negative feelings and thoughts, and might have improved problem-solving skills (Aldao, 2013; Blair & Diamond, 2008; Sowislo & Orth, 2013; Stockings et al., 2016). Intervention programs that use CBT in school are effective in preventing internalizing disorders, like depression and anxiety (Stockings et al., 2016). Rap&SingMT interventions aimed to modulate (negative) emotions of adolescents due to, for example, unstable peer relationships (Zimmermann & Iwanski, 2014) and succeeded by engagement in goal-directed behaviour. Participants freely expressed their feelings about vulnerable subjects in raps and lyrics, such as bullying or the desire for friendship, and were encouraged – not treated as having individual problem behaviour, but supported in this complex route of self-regulation in school (see an example of rap lyrics at the start of the article). Furthermore, teacher total scores (SDQ) were significant, they were able to observe all students: in Rap&SingMT as well as in control group sessions, including adolescents without permission for data collection. Teachers were curious to witness the musical experiences of their pupils, similar to the interest in the control group's performance during their self-applied intervention. Parents did not witness this process; they filled in tests, and later received a summary of sessions on DVD after Rap&SingMT was completed. The observed differences between measurements of parents and teachers might have been influenced by their different observer-roles, as the latter were present during both the Rap&SingMT and control group sessions, and the former were not. Further, adolescents were strongly motivated and involved in the Rap&SingMT,

but disliked filling in the questionnaires and argued that the questions were "not connected to the music". By sensing this, and not being able to translate their personal music experience into a verbal questionnaire, those missing measures about their true feelings after Rap&SingMT might have biased our results. Also, non-significant results of SPPC total scores might reflect a lack of correlation between musical experience and scales of "scholastic and athletic competences and appearances". Consequently, individual changes or anticipation patterns about emotion regulation subjects of the adolescents were possibly partially due to the negative responses of adolescents to verbal tests. This poses a challenge for the interpretation of (non)significant Rap&SingMT effects of single tests versus an interesting visible tendency on the significant test summary. Test scores yielded small, medium or large effects of Rap&SingMT interventions; thus careful interpretations about these pre- and post-intervention measures are required. Further, correlational analysis failed to show statistically significant relations and insights between groups, times and demographics. No further conclusions about age, gender, family condition or indicated level of problems (SDQ teacher score) can be drawn about adolescents' emotional and behavioural functioning, and both groups appear heterogeneous.

Limitations

This study evaluated the applied Rap&SingMT on short-term effects of self-regulative ability of adolescents during a period of four months. To our knowledge, it is the first study on the underrepresented subject of music and emotion regulation in a school group setting, and we tested its application. There were no other studies to compare with, nor existing validated measurements for music and emotion assessment. For long-term emotional and behavioural adaptation processes, interventions and assessments might need to cover longer periods of time, and to repeat interventions for at least 9 or 12 months, to specifically reduce internalizing problems (Stockings et al., 2016). The short Rap&SingMT cycles of 45 minutes once a week during four months interfered with school schedules, which limited the number of sessions from 16 to 13. This might have resulted in a lack of effects for adolescents as well as for parents being aware of adolescents' emotion-related behaviour. Further concerns about collected data, from subjective experiences and reflections by Rap&SingMT participants, revealed that adolescents were unable orunwilling to translate their "lived music experiences" into words. Musical emotions seem not to be directly translatable into words (Aljanaki, Wiering, & Veltkamp, 2016; Schellenberg, 2011), an often-discussed theme, and this is especially true for pre-verbal experiences during "flow" moments in music. Also, those concerns deeply explored the missing links (Hesse-Biber, 2012) between the experiences of adolescents and the results from the interviews as 'pleasurable music activities', their 'learning processes' and filling in 'text-based problem-questionnaires'. Thus, based on our results, we challenge the suitability of these verbal questionnaires as qualitative adequate assessments of applied music interventions (Schellenberg, 2011) in relation to emotion regulation processes (Aldao, 2013; Gratz & Roemer, 2004). Additionally, involvements in music styles, like rap and hip- hop, incorporate important personal, cultural and political messages – which need to be sincerely debated, also in music therapy (Cundiff, 2013; Oden, 2015; Uhlig et al., 2016; Viega, 2015). Our study underrepresented those subjects because of its primary pleasurable, nourishing and evocative character as a school activity, where those themes did not appear within our "white" population during this short intervention time. Further, in order to minimize confirmation bias in this study, the principal researcher continually attempted to re-evaluate all beliefs and impressions: not becoming involved in performance of Rap&SingMT session or testing; not participating in class-, teacher- or school-meetings during the study, except for planning issues; not pre-judging the responses that could confirm the hypothesis; not reviewing any data during the Rap&SingMT performance prior to analysis; and not using respondents' information to confirm impressions about the adolescents. Although those precautions were applied, some evidence could have been dismissed that supported our hypothesis by the natural tendency or shortcoming of not being able to filter all information.

Conclusion

We compared the effect of Rap&SingMT on emotion regulation to a control condition, whereby Rap&SingMT yielded significant improvements on measures of emotional symptoms and hyperactivity/inattention items (SDQ T), and on the DERS subscale of "difficulty engaging in goal-directed behaviour when distressed". No other applied measures showed significant outcomes. However, there seems to be an overall benefit of Rap&SingMT, indicated by its significantly declined problem score of all measures, as opposed to the control group – a promising result. Our findings point to links with studies for emotional and motivational engagement, as Rap&SingMT provided group collaboration by identifying sensitive personal and peer themes in a safe music therapeutic environment, to enhance skills for well-being in adolescence.

Ethical approval

VCWE registration number 2500: this approval was sufficient, no CCMO (Central Committee on Research Involving Human Subjects) or Medical Ethical Committee registration was required, permitting this research in a non-clinical school setting.

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My friend (name),
he/she is the best
He/she is different than all the rest
He/she is so smart and fun as can be
He/she is the coolest friend ever,
he/she is perfect to me!
Friendship is so great,
but at times can seem tough
Just treat your friends with kindness
and keep sharing the silly stuff.
Friends are so important,
even if you only have one
Because without our friends,
life would be less fun![14]

[14] Example of group expression of adolescents social involvement concern about friendships. Their transformed feelings and thoughts were woven into rap lyrics during the performed Rap & Sing Music Therapy of this study (translation from Dutch: naam jongere… is de best, hij/zij is niet zo als de rest, hij/zij is mijn moppie, hij/zij is n' koppie, ja dat weet je best! Vriendschap, ja vriendschap is zo fijn, vriendschap doet soms pijn. Vriendschap, ja vriendschap is zo leuk, je ligt soms in een deuk... maar zonder vriendschap is niet te leven!).

Chapter 5

Rap & Sing Music Therapy for adolescents in a group school setting as motivational support to improve executive functions – RCT study

Submitted:

Uhlig, S., Jaschke, A., Jansen, E., & Scherder, E. (submitted). Rap & Sing Music Therapy for adolescents in a group school setting as motivational support to improve executive functions – RCT study.

Abstract

Background: Music interventions can be applied to enhance emotional wellbeing, and might also enhance higher-order cognitive functions, such as executive functions. This study investigated Rap & Sing Music Therapy (Rap&SingMT) in a non-clinical, school based intervention, to improve executive functions for adolescents.

Method: 98 adolescents (grade eight) in a public school in the Netherlands participated in a randomized controlled trial. Rap&SingMT and a control intervention were applied to six classes once a week over four months. Measurements took place at baseline and at the end of the intervention. Primary outcome data included measures of executive functions, inhibition, planning and working memory. Secondary outcome data involved a qualitative video analysis.

Results: Data, analyzed from 66 adolescents, did not reveal significant differences between groups concerning executive functions assessed by standardized tests. However, video analysis suggested improved *momentary* executive control experiences of increased action-awareness during the music process in which EF are enhanced indirectly.

Discussion: Possible explanations are related to reduced intensity of the intervention, and sample size, as well as to insensitivity of tests to the mixture of different types of stimuli during the music making process. The different focus during music therapy sessions versus music education related to EF is discussed.

Trial registration: Vrije Universiteit (VU) of Amsterdam, VCWE 2500.

Keywords: school based intervention; music therapy; rap; singing; executive functions; emotion regulation, wellbeing, RCT

Introduction

Music interventions have a beneficial influence on the emotional wellbeing of adolescents and youth with respect to their personal resources in socio-emotional development. Music listening is often used to affect self-regulation and to restore and improve health (Baltazar & Saarikallio, 2016; Saarikallio, Baltazar & Västfjäll, 2017). Active music participation showed various benefits for young people, as they themselves described 'music as a necessary component of adolescent life' (Campbell, Connell, & Beegle, 2007). The benefits of engaging with music are said to depend on young people's individual, motivated application: to improve mood, to express identity, to manage relationships or to cope with challenging life situations (McFerran, Garrido, & Saarikallio, 2013). In general, music modulates mood and stress (Janata & Grafton, 2003; Koelsch 2011; Molinari, Leggio, & Thaut, 2007; Schäfer, 2016; Stegemann, 2013) and improves contact, coordination, and cooperation with others (Koelsch et al., 2013).

Music and cognition

Apart from mood, behavior and wellbeing, a number of studies revealed the beneficial effects of music on cognitive abilities, such as improved speech and reading ability after one year of instrumental music training (Kraus et al., 2014b), as well as enhanced verbal learning and verbal recognition after a longitudinal study (Roden, Kreutz, & Bongard, 2012). Beneficial effects of music education on academic, thus cognitive, achievements are called *far* transfers, and differ from *near* transfer, which are related to fine motor control, the perception of pitch, rhythm, timbre, melody, sound differentiation and creativity. Commonly, *near* transfer appears when students are learning to sing or play an instrument, while investigation of *far* transfer is more difficult to study (Author 2, Related Authors & Author 4, 2013). However, current understanding of this *far* transfer from music education to other cognitive skills (reading, writing, mathematics and intelligence) is scattered (Dumont, Syurina, Feron, & van Hooren, 2017) perhaps due to a lack of uniform research methods. No guidelines or consistent research protocols for long-term research design exists, and the necessity to develop one approach for investigation in order to overcome these problems has not yet been properly addressed. More uniformity could provide guidance for divided examination of single skills into sub-functions of music (Author 2, Related Authors & Author 4, 2013).

Executive Function

A first step to understanding this far transfer is to examine the effects of music on cognitive sub-functions that underlie reading and writing, the defined executive functions (EF). The basic components of EF, inhibition, planning, working memory and mental shifting, are directly related to motivation and emotion rather than purely to motoric impulses (Aron, 2011; Mitchell & Phillips, 2007; Riggs, Jahromi, Razza, Dillworth-Bart, & Mueller, 2006; Hofmann, Schmeichel, & Baddeley, 2012). Studies about motivated engagement of young people in music education show enhanced EF (Miendlarzewska & Trost, 2013) in task switching, cognitive flexibility and working memory, after short- or long-term music training (Moradzadeh, Blumenthal, & Wiseheart, 2015; Moreno, Bialystok, Barac, Schellenberg, Cepeda, & Chau, 2011; Roden, Grube, Bongard, & Kreutz, 2014; Schellenberg, 2004; Slevc, Davey, Buschkuehl, & Jaeggi, 2016; Zuk, Benjamin, Kenyon, & Gaab, 2014). Again, not all findings were consistent, due to the individual differences or dispositions of participants, as well as the specific employed measurements and confounded variables, as repeatedly addressed by researchers (Slevc et al., 2016, Moradzadeh et al., 2015; Gill, 2012; Zuk, Benjamin, Kenyon, & Gaab, 2014). Moreover, the challenge to investigate the effect of music on EF on a neurological level (Schellenberg, 2011), lies in the multitude of engaged brain regions (Zuk et al., 2014). Particularly during adolescence, frontal/prefrontal and subcortical processing of auditory stimuli, synaptic pruning and neural restructuring is still developing in areas of the brain which involve EF (Krizman, Marian, Shook, Skoe, & Kraus, 2012; Tierney, Krizman, & Kraus, 2015).

Vocalization

Vocalizations, as applied during our rapping and singing intervention in this study, involve words and melody, and the distinctive neural features of language and music share parallel complex sound structures (Brown, Martinez, & Parsons, 2006). Vocal interventions involve bi-hemispheric networks for vocal production (Özdemir, Norton, & Schlaug, 2006), and regular vocalization might increase the connectedness between syllables and words (Wan & Schlaug, 2010), to improve verbal skills. The human neural system mediates phonological and rhyming judgments at early ages (Weber-Fox, Spencer, Cuadrado, & Smith, 2003), and could manifest vocalization as *intensifier* for speech, reading and spelling, and as a step in the creation of language (Patel, 2008a). The efficiency of processing rhyme is still developing in adolescence, due to incomplete left hemispheric functioning, but they easily memorize strategies, like "Columbus sailed the ocean blue in fourteen hundred and ninety two" (Oswalt, 2018). Around the age of 10, the nonsense word-repetition task has accurately developed for auditory phonological perception and production abilities. Experiments with word-sounds for reading and spelling at this age could support the development of the neural system to integrate phonological and orthographic codes (Weber-Fox et al., 2003). Further, stimulated activity in the right hemisphere aims to activate motor function and vocal self-monitoring during singing (Jeffries, Frits, & Braun, 2003). Support for timing mechanisms for production of words in song (Jeffries et al., 2003) also arises from dorsolateral prefrontal cortex activity, and might involve sequencing behaviors, to regulate emotions and EF.

Rapping and singing intervention

In this study, we used a rapping and singing intervention to stimulate the bi-hemispheric networks and to strengthen EF in adolescence, by utilizing three musical elements, as described in the study protocol (Author 1, Author 3 & Author 4, 2015): (1) Rhythm, for effective rhythmic engagement, to synchronize emotional expression to an external beat, to stimulate cooperation in the group, and to anticipate changes in music. (2) Rapping and singing, as pleasurable vocal expressions, to involve a greater emotional engagement and to reduce tension. (3) Vocalization and verbalization, linking syllables and words, for transforming emotions into words to encourage cognitive processing and learning through rap/song development. Rhythm structures one's ability to synchronize to an external beat – a typically human capacity (Koelsch, 2015; Thaut, 2013), supporting group cohesion and cooperation by entrainment processes (Phillips-Silver, Aktipis, & Bryant, 2010), as well as inducing feelings of "being together" (Gill, 2012; Koelsch, 2015). Rap is based on predictable rhythmic patterns of rhyming couplets to an insistent beat, and, in this study, aims to transform primary emotions into words. Rap yields a safe "bridge" between singing and talking (Author 1, Author 3 & Author 4, 2015), and singing research has shown emotional improvements of mood, wellbeing and reduction of tension (Clark & Harding, 2012; Clift & Hancox, 2001, 2010; Jeffries et al., 2003; Özdemir et al., 2006; Wade, 2002; Zarate & Zatorre, 2008).

Rap & Sing Music Therapy (Rap&SingMT)

Music therapy aims to build nurturing relationships to enhance wellbeing by engaging adolescents in popular music, and by expanding the understanding of music's potential and possibilities within the school community. Combined with a motivating music strategy, age-appropriate verbal communication and discussions about identification of personal themes or stressors are included (McFerran & Wölfl, 2015; Stige & Aarø, 2011; Tomlinson, Derrington, & Oldfield, 2011). The rapping and

singing intervention in the current study invites adolescents to dialogue about those themes, and motivates them to strongly engage in the music making process by creating their personal songs as rewarding effort. Transformed vocalizations of expressed 'true feelings' (Short, 2013) into understandable lyrics (Pennycook, 2007), provide enhanced emotional wellbeing for youth in different Rap music therapies (Author 1, 2011; Hadley & Yancy, 2012; McFerran, 2010, 2012; Short, 2013; Travis, 2013; Viega, 2013). By incorporating adolescent' personal, social or cultural messages, with both positive and negative themes, authentic conversations arise during the Rap music therapy process (Author 1, Related Authors & Author 4, 2016; Cundiff, 2013; Oden, 2015; Viega, 2016). Hereby, adequate psychological safety for the personal and vocal expressions of adolescents is provided, which are therapeutically contained. Working towards self-regulatory skills to improve wellbeing, the creation of more awareness about rhyme, words and language will be inspired (Author 1, Related Authors & Author 4, 2016).

Rap music capacities & concerns

Rap artists claim to express 'the unspoken truth' (Rodriguez, 2014), and provide a valid engagement tool of empowerment for youth with strong cultural and musical messages. Despite the widespread public critiques, Rap and its cultural themes encourage critical thinking and reflection - particularly *because* of the use of controversial subjects (Christianakis, 2011). Working with Rap and Hip-Hop in school and therapy requires a personal and cultural dialogue in those settings, and invites participants to discuss uncomfortable themes about peers, genders, race, class, power, and privilege (Christianakis, 2011; Viega, 2016). On the other hand, a negative connotation often appears with Rap, because of its strong emotional expression and regularly explicit and offensive language in which violence is endorsed. This prevalence of violence is not only related to Rap music, but includes movies, television and video games, a nurtured environment of globally cultivated (and accepted) violence (Richardson & Scott, 2002). Hip-hop, and especially Rap, primarily developed from poverty, deprivation, unequal opportunity, hopelessness, and distrust, and is merely a creative expression of personal and cultural difficulties in which music, dance, graffiti and fun were combined (Elligan, 2004). Although the mass media's focus has marginalized Rap's political messages and critiques, and while Rap with a positive message does not sell - mostly the provocative (violent) lyrics are profitable for artists and producers, serving a self-created community demand (Oden, 2015). Nevertheless, the power of Rap lies in these authentic messages, as it developed as a popular music style of different ethnicities, also in the Netherlands (Pennycook, 2007). The use of Rap in schools opened those dialogues as it succeeded for challenging issues in linguistics, to motivate and negotiate through rhymed poems about e.g. (no)interest in school, science and personal learning (Christianakis, 2011; Emdin, 2010; Miranda & Claes, 2004).

The present study of Rap&SingMT offers rapping and singing engagement for each adolescent to work towards individual goals, as it aims to stabilize emotional imbalances to improve EF in a school-based music therapy program. It proposes a positive school engagement strategy (Inchley et al., 2016), to influence the willingness to learn new tasks for better school performance (Jones & Zigler, 2002). Our application combined the different practices of RAP (Rhythm And Poetry/Rap As Poetry, using a repetitive beat for rhyming patterns) with singing, alongside the discussion of the different kinds and messages of this music style in our group setting. The easily applicable rapping and singing activities (no instruments or fine-motoric skills are needed) aim to stimulate individual and group commitment, and social participation, as they are applied for the first time in a school group setting, examining the effects of Rap&SingMT on EF by way of a Randomized Controlled Trial (RCT).

Methods

Participants

A total of n=250 Dutch-speaking adolescents and their parents/caregivers were informed about this study, and boys and girls in grade eight (age range 8-12), were recruited at ''De Lanteerne", a public Jena-plan-school[15] in Nijmegen, the Netherlands. From a total of eight classes, two classes were excluded from this research due to participation in external music lessons. The remaining six classes underwent the Rap&SingMT intervention during regular school hours; two of these classes were informed about their waiting status due to their control condition, and one class served as a pilot, and was not included in the final analysis. A total of 98 adolescents participated in the multi-testing data collection, and EF data was finally collected from 28 boys and 38 girls (46 Rap&SingMT participants versus 20 control). There was no pre-screening for special needs conditions: all adolescents (with/without behavior and/or developmental delays) but only those with parental/caregivers' permission, were included in the data collection. All remaining adolescents (without permission) participated in the assigned Rap&SingMT or control condition

[15] The Jena School system is centered around concepts of learning through self-discovery within a community. Different age-groups are in one class and work with an integrated curriculum, like dialogue, play, work and celebrations.

in each class. Demographic data, consisting of age, gender, marital status of parents and family structure, parents' working status, parents' education, parents' interests and hobbies, family activities and former music education of parents and adolescents were provided by parents or temporal caregivers.

Sample size

A relatively large sample size was taken, as the current study represents the first one of applied music (therapeutic) rapping and singing interventions for EF improvement in a school setting for adolescents. Our power calculation anticipated for dropout rates, and considering an experimental versus control condition (two group design), and estimated sample size required 45 participants per group for a required 80% power threshold with pre- and post-intervention measurements. Involving six school classes, the possible risk of Type II errors was reduced (Banerjee, Chitnis, Jadhav, Bhawalkar, & Chaudhury, 2009) within the feasibility of a small effect size (f=0.15; Faul et al., 2007).

Randomization

Adolescents from six classes were randomly assigned by an independent researcher from VU University Amsterdam, the Netherlands, who blindly allocated them to participate in our study: three experimental and two control groups were selected, whereas one class (n=30) was excluded from the main study due to a pilot that took place before the start of the present study, resulting in an unequal randomization ratio of 2:1.

Research assistants as well as the qualified music therapists were blind to all information about the participants: the first performed testing after music and control group interventions without involvement in both; the second worked with all adolescents in the classrooms, but did not participate in the testing, thus not knowing who actually partook in data collection.

Design

This single-blind randomized controlled trial (RCT) with waitlist control and multi-testing design, is part of a larger study which includes data collection in a classroom group setting, performing Rap&SingMT to improve psychological wellbeing (Author 1, Author 3, & Author 4, 2015, 2017), sleep (Author 1, Related Author & Author 4, 2018), and executive functions. This study also includes the performance of qualitative inquiries to gain insight, to improve, to refine and to further develop the conditions for an effective performance of the intervention (Hesse-Biber, 2012), as well as to learn from unexpected effects that otherwise go unnoticed. The Consolidated Standard of Reporting Trials (CONSORT) is presented in Figure 1.

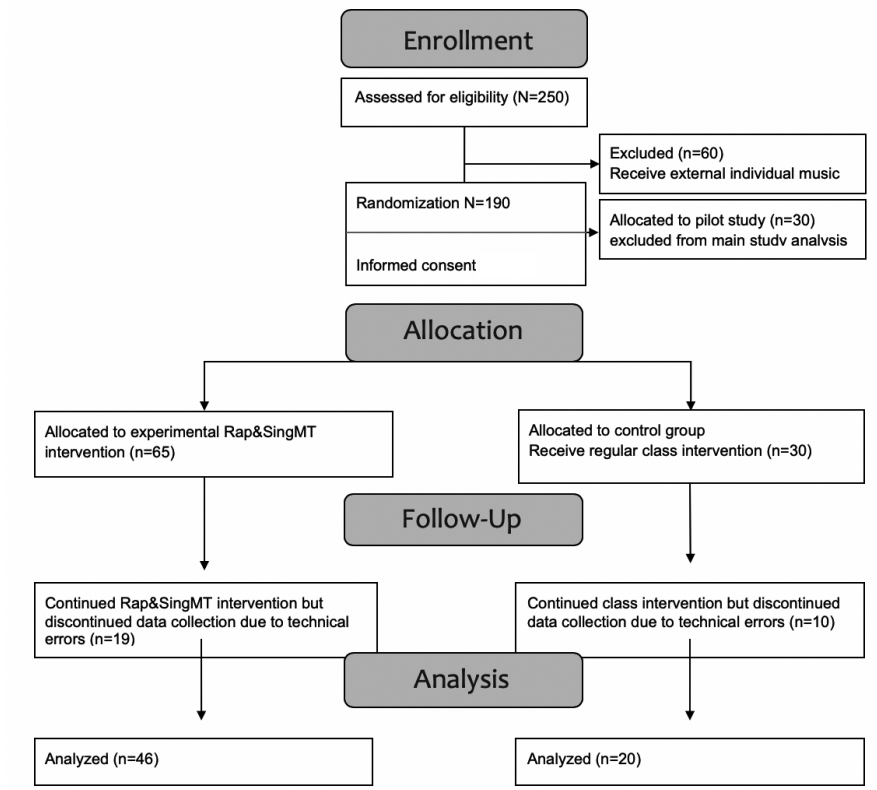

Figure 1. Flow diagram of randomized controlled trail of Rap&SingMT study investigation of EF

Ethical approval and consent

Approval was given by the scientific and ethical review committee of the Vrije Universiteit Amsterdam (Vaste Commissie Wetenschap en Ethiek, VCWE: Scientific and Ethical Review Board[16]) for construction and completion of this study. Permission was granted by the head of the Jena-Plan-School in Nijmegen to perform the RCT during regular school hours. Information for parents/caregivers regarding permission for RCT participation, audio/video recordings and informed consent forms was provided prior to research activities, and their approval for data collection was received by signed forms.

[16] VCWE registration number 2500: this approval was sufficient, no CCMO (Central Committee on Research Involving Human Subjects) or Medical Ethical Committee registration was required, permitting this research in a non-clinical school setting.

Material and procedures

Intervention

An estimated 16 sessions of 45 minutes once a week, was offered in this RCT to the Rap&SingMT and the control group, as both intervention were designed for large groups of 30 adolescents per class. In line with other school group intervention studies focusing on prevention (Calear & Christensen, 2010), Rap&SingMT and controls received weekly instructions, the first group by trained music therapists and the second group by regular classroom teachers, both over a period of four months (during school time). In each class two Rap & Sing music therapists collaborated during eight weeks to develop group cohesion as well as to teach basic skills of rapping and singing. After these eight weeks, each of the classes were split into two subgroups of 15 adolescents, and continued for the next eight weeks with one therapist, developing individual and group rap-songs. Classroom teachers performed the control group intervention as 'usual', and they applied school themes and goals for their students during 16 weeks. These themes varied strongly - e.g. language, math, games, art - within their multi-age sub-groups. Music therapists worked on specific group- and individual themes, developing rap-songs during Rap&SingMT, and prepared adolescents for audio and video recordings. In addition, training was provided prior to performance of the Rap&SingMT to all qualified music therapists. Also, supervision and evaluation sessions during the entire research period were offered as communication platform for the professionals (Calear & Christensen, 2010). All Rap&SingMT music therapists, researchers and assistants were involved in school team meetings in which the development of the adolescents was not discussed, but only organisational arrangements with teachers and school were managed. Team meetings at the Jena-Plan-School for the classroom teachers were performed as usual.

Procedure

Entire school classes participated in group (music and control) interventions, including those adolescents without parental/caregivers' permission for data collection, who were not tested. Both control groups were informed about their control status, their exclusion from the first round of music data and their postponed Rap&SingMT sessions. All participants of the RCT underwent two primary outcome measurements: pre and post, before and after the (music/control) intervention, respectively. A composite of three assessments provided test-variability for EF (iPad tests) and was administered by trained research assistants[17], and took about 10-20 minutes (depending on the participant). The adolescents were monitored and guided by the research assistants during the two periods of group data collection at school, over the course of six months. Additionally, audio and video recordings of all sessions were made for later observational analysis, which allowed zooming in on important *music moments* during the performing process.

Main outcome measures

Primary outcomes. Executive functions, i.e. inhibition, planning, and working memory were assessed by three different computerized tests, using an iPad application on a touch sensitive screen. The iPad offered wireless data collection and provided movability to different rooms with subgroups for quiet testing in the school environment.

Inhibition. Assessment of inhibition was performed by the Stop-Signal-Test (ST) (Verbruggen & Logan, 2008). The Stop-Signal paradigm has been shown robust reliability and valid estimate of inhibitory control (Congdon, Mumford, Cohen, Galvan, Canli, & Poldrack, 2012). Investigation in Stop Signal Reaction Time (SSRT) for stopping responses (inhibition), was applied as reactive control action, whereas Reaction Time (RT) offered data about response latency in proactive behavior (Aron, 2011). As inhibition ability improves with age (Van den Wildenberg & Van der Molen, 2004), younger children (comparing 7 with 10 years of age) were expected to react slower and make more mistakes than older ones. The performance of the ST presents a 'go' stimulus, i.e. a picture of an airplane on the iPad, and a '*stop*' signal, a cross placed over the airplane. When the airplane appeared, either pointing to the right or left side of the iPad-screen, participants should press the corresponding button. No buttons should be pressed if the stop signal is presented after the airplane's appearance with a delay. The delay time is adjusted dependent on performance of the participant, presenting that proactive changes occur in the anticipation of stop signals. This allows for an average of 50% of successful responses to the trials, and participants were instructed to react as quickly as possible.

Planning. To measure the ability to plan, the *Tower of London Test (ToL*) was used (Kovacs, 2013; Krikorian et. al., 1994). The test requires an integration of interrelated skills, e.g. focus with sustained attention as well as with plans and strategies for the attainment of these goals (Anderson, Anderson & Lajoie, 1996). The ToL has been shown to be a reliable measure for planning ability in group-based studies and with individual participants, children and adults

[17] Master students in Clinical Neuropsychology of the VU University Amsterdam.

(Sikora, Haley, Edwards, & Butler, 2002; Köstering, Nitschke, Schumacher, Weiller, & Kaller, 2015). The ToL test has a strong relationship with age and maturation of prefrontal development (Krikorian et al., 1994), and might reveal different academic strengths and weaknesses (Sikora, Haley, Edwards, & Butler, 2002) - not related to music. The test-retest reliability is reasonable and further uncertainties of the ToL regard a possible learning effect over time as well as the increased levels of difficulty of the test items (Kovas, 2013). Participants of the ToL test are instructed to move colored balls onto rods in a specified minimum number of trials, and as quickly as possible. Participants' completed number of moves were recorded separately for the different levels and versions of the task, whereas lower scores indicated better performance (Schellenberg, 2011).

Working memory. To assess the abilities of task-switching and working memory, the *Trailmaking test (TMT)* was performed (Reitan, 1955; 1971). Generally, the TMT measures executive functions and has a good test-retest reliability, but shows some vulnerabilities to practice effects, as well as to the mixture of different types of stimuli (Bowie & Harvey, 2006; Salthouse, 2011; Moradzadeh et al., 2015). TMT consist of two parts, part A: a visual scanning task, which requires participants to draw lines connecting circled numbers from 1-25 in sequence as quickly as possible (Bialystok & DePape, 2009) without losing touch with the iPad-screen, and Part B: a more advanced switching task, requiring to draw lines to connect numbers and letters in alphabetic sequences like 1a; 2b; 3c. Score-measures of both results are the response times in seconds, as required to complete the task for each part; lower scores reveal better skills (Bialystok & DePape, 2009; Zuk et al., 2014). Dividing part B by part A scores reveals a ratio score, e.g. a large difference of cognitive flexibility, measuring diverse aspects of TMT performance (Roberts & Horton, 2003).

Secondary outcome. Additional qualitative assessment tools were applied to investigate important aspects of the integral character of the musical experience (see study protocol). A qualitative video microanalysis of Rap&SingMT recordings of the sessions provided insight into subtle changes or developments during the musical process, as well as unanticipated nuanced relations (Spiro & Himberg, 2016), as support to our results for future directions. The video microanalysis involved a video-analysis-tool for *event sampling,* which was specifically developed for this study, and conducted a systematic observation, transcription and analysis of videos, to determine how often a specified *event* (*music moment*) occurred, and quantified them (Verhoeven, 2015). Within the focus of this EF-study, only a summary of this video analysis is described, while the performed qualitative method of this assessment is presented elsewhere.

Video microanalysis instrument. For the development of the video-analysis tool, observational data from interviews of therapists, who performed the Rap&SingMT, were used to determine the defined subjects of our study. Additionally, based on observations of individual music therapy sessions (developed by Scholtz, Voigt, & Wosch, 2007, p67-79), we focused on the *musical moments* of interaction between therapist and participant for our analysis. The thorough descriptions of the selected and observed *music moments* in this study, were inspired by studies about vocal and verbal expressions, entrainment, cooperation and rhythm (Christianakis, 2011; Clayton, Sager, & Will, 2005; Phillips-Silver et al., 2010; Poismans, 2011), as they are related to the subject under investigation, centering around the effects of *vocalization*, *verbalizatio*n and *rhythm* (see study protocol, Author 1, Author 3 & Author 4, 2015). According to Scholtz et al. (2007), the substantive themes occurring during our selected *music moments* in sessions, were further differentiated into types of *movement* (during body percussion) and observed *gestures (*during music activities), specifically related to *being in* or *out of rhythm*, and were recorded every 5 seconds for data collection. Related to their appearance during the music making process, those *music moments* were coded and separated into different group sizes of adolescents' participation for quantitative analysis (Table 1). For identification of the frequency of occurrence, percentages of those observed moments were defined from high to low in categories of *predominant, average, rarely* or *never* (Table 2), respectively, in line with Scholtz (2007; Scholtz et al., 2007).

Tables Qualitative inquiry: video microanalysis

Table 1.

Legend	Large group <16	Small group >16	Group individuals +/-7
X	1 – 10	1 - 5	1 – 2
XX	10 – 20	5 - 10	2 – 5
0	20 – 30	10 - 15	5 – 7

Occurrences of *music moments* in different group sizes of adolescents

Table 2.

Predominant	average	rarely	never
>66%	33.3 – 66.6%	<33.3%	0%

Frequency of *music moments* **in percentages**

Statistical analysis

To preserve the sample size and minimize missing outcome data, our quantitative analysis was retrieved on intention to treat (ITT), based on the initial treatment assignment (Gupta, 2011). Demographic variables were controlled and analyzed by means of Mann-Whitney U-tests. Potential treatment effects were analyzed by a repeated measures analysis of variance (ANOVA) with between-subject factor Group x Time, and within-subject variables of time (pre/post) measures. Effect sizes, are presented as partial eta-squared (np2): small (.010), medium (.060) and large (.140) (Cohen, Manion, & Morrison, 2013). Further, z-scores and paired t-tests were applied to compare the scores of the contrasting groups, testing correlation coefficients, as described in Cohen and colleagues (2013). For the statistical analysis, the level of significance was set at $p < 0,05$, and analyses were performed with SPSS 23 (IBM Corporation, 2015).

Results

Table 3.

Demographic data	Rap & Sing MT group (n=46)		Control group (n=20)		Mann-Whitney-U & T-Test		
	M	SD	M	SD	Z		P <
Age (8-12)	10.13	1.31	10.40	.681	1.081		.28
Gender (28 boys/38 girls)	1.52	.505	1.70	.470	1.336		.18
Education parents (elementary/college/ higher education)	3.65	.766	3.45	.826	1.228		.21
Music education parents (years/ instruments)	4.18	5.39	4.25	7.25	.519		.60
Music education adolescents (years/ instruments)	1.06	1.31	.915	1.16	.529		.59
					T	df	p
Family conditions home (single/married/ kids) t-test	2.74	.743	2.65	.671	46	64	.64

Group characteristic demographics of Rap & Sing MT and control group (Mann Whitney-U- and T-test)

Demographics. There were no significant differences between the Rap&SingMT and control group concerning age (t(67)= .24; $p < .82$), and gender (Chi-square X2=2.24; df=1; $p < .14$), and no significant differences between groups were found concerning family conditions, parents' education, music education of parents and adolescents, as indicated in Table 3.

Table 4.

Tests scores*	Rap & Sing MT (n=46)				Control group (n=20)				Statistic			
	Pre		Post		Pre		Post		F	Df	p	n2
	M	SD	M	SD	M	SD	M	SD				
TOL	27.13	3.38	27.46	3.62	27.30	2.38	27.20	3.23	.18	1	.67	.003
Trail Making A	14.40	3.13	13.15	3.07	15.23	5.86	12.54	2.41	1.60	1	.21	.024
Trail Making B	24.26	6.27	20.82	5.85	24.58	9.71	21.53	6.17	.03	1	.85	.001
Trail Time BA	1.70	.40	1.59	.34	1.67	.51	1.71	.37	1.25	1	.26	.019

Effects of EF assessments: test scores of pre- and post-measures Rap & Sing MT intervention and control group. Note. M=mean; SD=standard deviation.*Decrease=improvement. GLM, general linear model; ANOVA, repeated measures analysis of variance; Trail Making A and B tests; Trail Time BA: Differences between B and A, if > 1 = large difference of cognitive flexibility; TOL: Tower of London test.

Executive functions. Data-analyses by means of a repeated measures analysis of covariance, showed no significant Group & Time interaction effect with respect to the performed tests: ToL, and Trailmaking task, A and B, as well as BA (for means, standard deviations and F-statistics, see table 4). The results of the Stop-Signal task showed insufficient trials diagnosed as being due to a technical problem of the iPad, and were therefore excluded from the analysis.

Video analysis

Qualitative data of our video assessment underwent a randomly selected analysis of the video fragment data of the sessions, performed by a second rater, to improve reliability. The interrater-reliability was greater than .70 over several video segments, and showed a reasonable agreement between the two raters, as addressed by Clifford, Young and Williamson (2007). From the 18 hours of video material, an estimate of 1064 minutes were assessed, which presented 76 minutes of *music moments* during the sessions (therapist and adolescent interactions), and measured by seven different variables (verbalization, vocalization, verbalization in/out of rhythm, vocalization in/out of rhythm, gesture, movement, movement in/out of rhythm). In those minutes, we registered a total of 3932 moments of action, related to the subjects of the study protocol: *Rhythm and rhythmic (body) engagement, vocalizations of singing and rapping, and verbalizations.* We analyzed 1735 active moments (44,13%) of therapists, and 2197 (55,87%) of adolescents, respectively. Frequently, during Rap&SingMT sessions therapists and adolescents spent their time mostly verbally, explaining and discussing interventions, or engaging in nonmusical themes *(verbalization out of rhythm:* therapists 71,74%, adolescents 51,9%). During all sessions, a limited amount of time with actual musical interaction was performed and *verbalization out of rhythm* covered an average of 30 minutes per session. The total time engaged in pure *musical moments,* without spoken words, was limited to an average of 15 min in each session of 45 minutes. However, while being engaged in those *musical moments,* like rhythmic movements *(movement in rhythm: 26,94% therapists and 30,35% adolescents*), in which increased bodily rhythmic activity was observed, other movements and gestures that were present during non-musical interactions, decreased, and heightened attention appeared, indicated by groups size ''o'', when the entire group was engaged in a circle during the music process (Table 5).

Table 5.

Qualitative inquiry video microanalysis											
Therapist											
Time (min: sec)	**08:20**	**08:25**	**08:30**	**08:35**	**08:40**	**08:45**	**08:50**	**08:55**	**09:00**	**09:05**	**09:10**
Voice											
Verbalisation	X	x	x		x	X	x	x	x	X	X
Vocalisation											
Verbalisation in Rhythm								x			
Vocalisation in Rhythm											
Adolescents											Start singing
Time (min: sec)	**08:20**	**08:25**	**08:30**	**08:35**	**08:40**	**08:45**	**08:50**	**08:55**	**09:00**	**09:05**	**09:10**
Voice											
Verbalisation		x		x	x	x	xx			X	
Vocalisation											
Verbalisation in Rhythm											x
Vocalisation in Rhythm											
Therapist											Start singing
Time (min: sec)	**08:20**	**08:25**	**08:30**	**08:35**	**08:40**	**08:45**	**08:50**	**08:55**	**09:00**	**09:05**	**09:10**
Body											
Gesture											
Movement in Rhythm	x	x	x	x	x	x	x	x	x	X	x
Movement											
Adolescents											
Time (min: sec)	**08:20**	**08:25**	**08:30**	**08:35**	**08:40**	**08:45**	**08:50**	**08:55**	**09:00**	**09:05**	**09:10**
Body											
Gesture	x		x	x							
Movement in Rhythm	0	0	0	0	0	0	0	0	0	0	0
Movement	x	x	x	x	x	x	x	x	x	X	X

Qualitative inquiry video microanalysis example of video analysis excerpt nr '3048-1': during body-percussion

Discussion

In the present study we investigated the effect of Rap&SingMT on executive functions, in particular inhibition, planning, and working memory, in adolescents. The rationale was that active engagement in vocalizations (rapping and singing) would appeal to stimulate bi-hemispheric networks (Özdemir et al., 2006), which increases the connectedness between syllables and words, and to improve neural processes of speech (Kraus et al., 2014b; Wan & Schlaug, 2010). Rhythmic timing is developmentally important to stimulate phonological sensitivity, as it exists in poetic rhyme and singing (Goswami & Bryant, 2016, xxi). Rhythm was used to synchronize to external beats and to support group cohesion and cooperation by means of entrainment (Koelsch, 2015; Thaut, 2013; Phillips-Silver et al. 2010). We hypothesized, that reducing stress and tension by rapping and singing, could stimulate the mechanism of self-regulation between emotion and cognition, to enhance EF and wellbeing (Clift & Hancox, 2001, 2010; Hofmann et al., 2012). However, we did not find these effects of Rap&SingMT on EF functions of inhibition, planning and working memory. To better understand this lack of effects, we have four main considerations.

The **first** consideration is related to the frequency and duration of the intervention. Because of school events, our scheduled number of sessions was limited from the planned sixteen to an actually performed thirteen sessions over the four-month period - without extend time. Similair, a study of Rickard, Bambrick, and Gill (2012) did not find cognitive effects in learning after a six-month school music program. However, to establish an observable increase in EF, longer periods of at least one year of training may be required, as is suggested by studies that link the intensity of practicing for music lessons to cognitive functioning (Author 2, Related Authors & Author 4, 2013; Moradzadeh et al., 2015; Schellenberg, 2011; Swaminathan & Schellenberg, 2016; Tierney et al., 2015; Zuk, Benjamin, Kenyon, & Gaab, 2014). Most studies recommend time frames of at least one-and-a-half years for educational interventions (Kraus & White-Schwoch, 2017), as positive influences of long-term music education on cognitive abilities such as inhibition and planning has been shown (Author 2, Related Authors & Author 4, 2018). Also, another video analysis of music therapy sessions provided improved musical interactions in later session, like longer and more shared rhythmic pulses in songs as well as during improvised music (Spiro & Himberg, 2016). Our study was not educational for practicing music skills but a therapeutic intervention - without focus on specific problems - and as recommended for school intervention studies of prevention, intended for four months (Calear & Christensen, 2010). Nevertheless, in our case the limited session counts may have resulted in a less robust execution of this music therapy intervention than intended which could have limited the impact on EF.

The **second** consideration is related to the missing data, which has resulted in a diminished sample size. Because of technical malfunctioning of some of the iPads employed, not all of the pre-programmed trials of the Stop-Signal task could be performed, leading some test assessments to score below the required number of trials (as low as 67 instead of a minimum 192). So, ST data was not analyzed further, as such inconsistency in the trial counts is known to influence overall test results (Alderson, Rapport, & Kofler, 2007). The missing data was spread between experimental (n=19) and control group (n=10), and the performed post-hoc power analysis was inclusive and therefore not beneficial. The suboptimal ST test measurements may have failed to yield sufficiently powerful observations: even in the case that there *is* an actual effect, it may not have been observable statistically.

The **third** consideration covers a conceptual concern of the focus of this research. We included a qualitative inquiry which was linked to questions about the performed intervention, investigating the complex, and difficult to assess, dynamic musical processes. This multi-methodology strategy moved our RCT toward more inclusive and contextualized insights (Hesse-Biber, 2012; Fetters, Curry, & Creswell, 2013). Our study primarily focused on quantitative EF data, but expanded findings to qualitative data, offering insights into the described complementary aspects of the intervention, as addressed by Fetters and colleagues (2013). The qualitative data of the video microanalyses suggested that the intentional use of rhythm (specifically in the case of body percussion), increased the joint focus through synchronization. The latter is likely to have occurred because of the characteristics of Rap&SingMT, which require adolescents to simultaneously process rhythm, motion and movement, calling upon their ability to switch between visual and auditory material. This is in line with reports in the literature of synchronizing behaviors during professional music performances, and evidence that complex cross-performer interactions involve both timing and motion of participants (Goebl & Palmer, 2009). As the auditory information is necessary for accurate cooperative timing of the performance, the understanding of the interpersonal communication is based on visual information. The perception of the motion of other performers alters their subsequent timing; likewise, the auditory perception of others' timing altered their subsequent motion (Goebl & Palmer, 2009). This suggests that the

adolescents engaged in a group *flow* experience, in which they are involved in a cooperative way by *increased* attention through synchronization during the observed bodily rhythmic activity. *Flow* moments are considered as *focused interest* during maintained *control*, a sharp attention and action potential in a calm state (Vickhoff et al., 2013). During this time, other movements and distracting gestures decreased and heightened attention appeared when the entire group (''o") was engaged in the musical process. Those *flow* moments lead to enhanced action-awareness, improving *momentary* executive control, as it is common during music performance (Chirico, Serino, Cipresso, Gaggioli, & Riva, 2015; Croom, 2015; Sinnamon, Moran, & O'Connell, 2012).

The **fourth** consideration covers the predominant use of verbalization during all sessions (70% of the time), which may have limited more rhythmic engagement and therefore inhibited the full effects of group cohesion, cooperation and concentration, and perhaps influenced EF. Music therapy engagement is based on processes, involving a continuously changing dynamic interaction between participants, and emphasizes a nurturing relationship, a fundamental influence to enhance wellbeing. Music therapists present a flexible attitude and openness to build on this relationship, and to interact with what adolescents bring into the therapeutic situation (Gold, Voracek, & Wigram, 2004). Reducing stress and tension through engagement in rapping and singing stimulated the mechanism of self-regulation, and significantly improved wellbeing (Author 1, Author 3 & Author 4, 2017), but could not be shown to enhance EF. Our EF assessment could have better aligned itself with this non-judgmental music therapy intervention, by providing a long-term therapeutic focus on individual difficulties within the group process to improve wellbeing - which varies from a lesson-focus to developing musical skills. The performed EF assessments in our study illustrated only two test examples in two specific situations (pre-post), which might not be related to these dynamic changes of individuals during our short-term music therapy process.

Concluding, this study is the first of Rap&SingMT in a school group setting, and we aimed to coexist with those different focusses in music education and music therapy. Although we applied standardized EF tests used in music education, this may have influenced our results. Nevertheless, validated tests for specific effects of dynamic music processes in relation to the various sub-functions of EF are needed (Aron, 2011; Author 2, Related Authors & Author 4, 2013; Moradzadeh et al., 2015; Schellenberg, 2011; Robb, Burns, & Carpenter, 2011). Although our qualitative analysis of the video recordings suggested some sub-functions to improve *momentary* executive control, especially on the dynamic processes of attention, this requires cautious interpretation because of the possible limitations of our standardized testing procedure.

Limitations. The strongest concerns of this study are about carrying out the EF-tests, while there was no comparable music therapy research available. Despite the reliable test-retest scores, all tests systematically could show different scores, illustrating just one test example in one specific situation, which could have changed over time, and not presenting insights in *how* our participants attempted to solve or change problems (Institute of Medicine, Committee on Psychological Testing, 2015). Further, neurobehavioral test reliability appeared more vulnerable to computer (digital devices like iPads) administered test reliability coefficients (Bracken, 2017; Campbell et al., 1999). Therefore, the application of the tests - as used for music lessons and EF assessment - exposed us to the same concerns as presented by other research, with multiple interpretations about analysis without uniform outcomes (Aron, 2011; Lipszyc & Schachar, 2010; Tang & Schmeichel, 2014; Verbruggen & Logan, 2008). Compared to those studies, the process of musical play: to anticipate, to plan, to create, and to finally perform music for recording, was continuously challenged, and assessment of multiple cognitive abilities during this dynamic interaction, could have been inclusive for EF testing (Schellenberg, 2011). Mixed effects might have been measured by examining switching ability with regard to music, like the fusion of visual and auditory stimuli, e.g. hand–eye coordination or (rhythmic) movement, as well as simultaneous processing of multiple elements during music, e.g. pitch, melody, rhythm, dynamics, notes and words (Moradzadeh et al., 2015). Those concerns are problematic, and the mixture of different types of stimuli during the music process are evidently challenging for research (Bowie & Harvey, 2006; Salthouse, 2011; Moradzadeh, Blumenthal, & Wiseheart, 2015).

Strengths. This study is a rigorously performed randomized controlled trial, with a single blind testing design, in which the music therapists and research assistants were blind to all information about the participants, and did not know which individuals actually partook in data collection of the participating groups. Additionally, music engagement also represents curiosity about others and the world around us (Lonsdale & North, 2011), as the rap-examples in our study demonstrated one adolescent's personal contribution[18]. Concerned about the development of emotional, cognitive and social skills to improve EF, the present study contributed to everyday functioning of adolescents as a

[18] See the examples of personal engagements of adolescents expressed in rap (Author 1, Author 3 & Author 4, 2017).

positive school engagement strategy (Inchley et al., 2016), as demonstrated by significant improved emotional wellbeing in psychological testing (Author 1, Author 3 & Author 4, 2017). The study was integrated in a daily school routine, and was added to the health potential for adolescents' cognitive and socio-emotional domains of development (Jones & Zigler, 2002). Single testing of the effects of music on EF, as performed in this study, did not show direct transfer of benefits. However, we did find alternative outcomes, as the performed video microanalysis established a modest consistency of evidence by showing patterns in the observations (Scholtz et al., 2007).

Future directions

Future studies require a broader perspective to improve the assessment of the effects of music, and to conceive music as a holistic experience, for which mixed methods are obligatory (Crooke, 2016), as well as differentiation of quantitative and qualitative aspects of group and individual ability development (Clark & Harding, 2012; Saarikivi, Putkinen, Tervaniemi, & Huotilainen, 2016). Both researchers and study-participants require multidisciplinary approaches to examine probable transferable effects of music engagement (Swaminathan & Schellenberg, 2016), to better investigate assumptions about cognitive effects of music programs, and to discuss justification of music's intrinsic value for learning in school (Rickard et al., 2012).

No further justification is needed to underline the social value of music in schools, and especially to include controversial themes about popular styles (Rap/Hip Hop), in order to positively engage the willingness to learn. In our study, the discussions about emancipatory or political themes of Rap as part of Hip Hop culture (Viega, 2013) did not appear during the performance of Rap&SingMT in our Dutch school. In contrast, our adolescents primarily expressed their social and emotional concerns within their school classes, while not expressing political needs or using violent lyrics in their songs (Author 1, Author 3 & Author 4, 2017). Sensitivity to identify and define Rap As Poetry, to 'lyricize spontaneously about everything' (Perkins, 1996, p.5), does not exclude its emancipatory capacity, but is suited to bridge the need for more commitment for integrated learning in schools as well as therapy.

Conclusion

No significant effect of Rap&SingMT on EF task improvements with adolescents was found. It remains unclear whether this lack of direct effect was due to reduced amount of sessions or sample size, or to limitations of the standardized testing procedure. However, observational video microanalyses of the intervention activities suggest that the Rap&SingMT may improve *momentary* executive control experiences of increased action-awareness in which EF are enhanced indirectly, and attention is sustained.

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When somebody gets bullied
all of the time
They might want to hurt themselves
or commit suicide -
Nobody likes a bully
or wants to be their friend
A bully will always pay
for being mean in the end.
Instead lets be friends
and start to be kind
No, I'm not joking,
let's put bullying behind
The world will be happier
if we all just get along
So let's just make peace,
because bullying is wrong[19].

[19] American-English Language translation of the original Dutch group-rap, created by adolescents during a Rap&SingMT session. The lyrics mirror adolescents' fears and worries about peer themes such as bullying and suicide, as well as wishes for social coherence, affecting their wellbeing: "Als iemand gepest wordt, pleegt hij misschien wel zelfs zelfmoord. Wij vinden pesten is niet leuk – maar hij die pest krijgt meteen een deuk. Wij zijn voor vriendschap. Nee, dit is geen grap. Iedereen heeft het fijn, als we samen vrienden zijn".

Chapter 6

Rap & Sing Music Therapy and sleep in adolescents: a single-blind cluster randomized controlled trial

Published

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Abstract

Background: It is known that music may enhance emotional wellbeing and that emotional wellbeing may have a positive effect on sleep. The goal of the present study was to examine whether a specific type of music, rapping and singing (Rap & Sing Music Therapy) could serve as a motivating engagement strategy in a group school setting to improve sleep in typically developing adolescents.

Method: Fifty-two adolescents received Rap&SingMT, 45 minutes, once a week, during 4 months. Twenty-three adolescents in the control group received a program that consisted of various mental activities, e.g. language, math or games and art – but no music. Actigraphy assessed 6 sleep variables: sleep time, sleep efficiency, sleep episodes, snooze time, onset latency, and wake percentage. Sleep assessments took place at baseline and after four months (post-testing).

Results: A repeated-measures multivariate analysis of variance failed to demonstrate a significant effect of Rap&SingMT on 'overall' sleep. However, a decline in total sleep time over a period of four months was less in the Rap&SingMT group than in the control group.

Discussion: Despite the fact that the participants did not suffer from sleep disturbances, a seasonal change over the experimental period of four months (from winter to summer) appeared to have less impact on total sleep time in the Rap&SingMT group. These findings will be addressed in more detail.

Trial registration: VU University of Amsterdam, VCWE 2500

Keywords: adolescents; school-based intervention; music therapy; rapping and singing; emotion regulation; self-regulation; wellbeing; sleep Actigraphy; RCT

Introduction

Childhood and adolescence are life-periods characterized by major changes in grey and white matter in the brain (plasticity), changes that are reflected in profound alterations in physical and emotional behavior (Cohen Kadosh et al., 2013; Leger, Beck, Richard, & Godeau, 2012). This is a very turbulent period for some young people. More specifically, one out of four adolescents may experience emotional problems, also referred to as internalizing problems, such as anxiety and depression (Hannigan et al., 2017). These youngsters may also suffer from externalizing difficulties such as aggressive and antisocial behavior and a decline in attentional processes (Hannigan et al., 2017). Others confirm that this life-period may be marked by negative moods (Abe & Izard, 1999). For example, adolescents may become more sensitive to social anxiety, which can emerge from a growing process of self-evaluation and comparing oneself with others, possibly resulting in sadness (Abe & Izard, 1999). The regulation of these emotional fluctuations is a continuous process during adolescence. The identification and categorization of others' emotions and one's own emotional response to these emotions form a crucial part of emotion regulation (Cohen Kadosh et al., 2013). The individual's emotional response may be a new emotion or an adjusted emotion (Moore, 2013).

In addition to emotional fluctuations, youngsters may encounter sleep problems (Hannan & Hiscock, 2015). According to these authors, such problems may include difficulties falling asleep, frequent waking during the night, and waking early in the morning. Other sleep problems may have to do with parents not setting consistent bed times, resulting in 'behavioral insomnia'. Insomnia may be due to anxiety, i.e. the child cannot fall asleep because of worries, or may occur for no discernable reason, such as in physiological insomnia (Hannan & Hiscock, 2015). As sleep disturbances frequently occur during childhood and adolescence, it is important to realize that they may coincide with emotional disturbances such as anxiety and depression (Gregory & Sadeh, 2012). Moreover, in nine-year-old children, sleep disturbances may even cause depressive symptoms (Armstrong et al., 2014). However, the relationship between sleep disturbances appears to be 'bidirectional', implying that mood disturbances might also negatively influence sleep (Gregory & Sadeh, 2012). Indeed, others confirm that emotional problems (feelings of loneliness, for example) might provoke depression, a decline in physical health, and insomnia (Harris et al., 2013). The question thus arises whether an intervention aimed at improving emotional wellbeing may also exert a beneficial influence on sleep.

It has been argued that a life-period like childhood and adolescence, characterized by brain plasticity, is the most sensitive time for interventions (Bradshaw et al., 2012; Cohen Kadosh et al., 2013). These interventions, preferably school-based, should particularly focus on emotion processing (Bradshaw et al., 2012; Cohen Kadosh et al., 2013). The rationale underlying the success of an intervention in this particular period is that youngsters experience a tremendous feeling of reward when they take their next step in emotion regulation (Bradshaw et al., 2012). Indeed, it has been observed that music lessons given to groups of children had a positive effect on prosocial behavior, but only in those who had low scores on prosocial behavior at the start of the experiment (Schellenberg et al., 2015).

Music appears to be one type of intervention that is particularly well-suited for enhancing emotional wellbeing. There is ample evidence that music yields emotional responses, which can be expected considering the neuronal networks that overlap in the processing of both music and emotions (Moore, 2013; Moore & Hanson-Abromeit, 2015). For the present study, it was important to select a type of music that is preferred by adolescents. Adolescents' preferred music often reflects their sense of self and how they choose to express that identity to others (Laiho, 2004). In adolescence, the choice of musical and lyrical style may reflect a youth's personal development, the need to become more independent (from parents, for example), the building of closer relationships with peers, identity formation, and the regulation of emotions by expressing feelings of anxiety and anger (Baker & Bor, 2008; McFerran, Garrido, & Saarikallio, 2013).

In the 1980s, rap became a mode for young black people and young Latinos in urban parts of the USA to give artistic and political expression to their needs and concerns, and as such served as a significant socio-political innovation (Rebollo-Gil & Moras, 2012). Rap is a complex art form that challenges many due to the tendency towards vulgar language, glorification of crime, and objectification of women within its lyrical contents (Rebollo-Gil & Moras, 2012). In our study, we used a modified form of rap music in a school-based music therapy program, combining Rhythm and Poetry (Rap) with singing in a group setting (Rap&SingMT). Thus, the historical, political, and emancipatory connotations of rap music as a part of Hip Hop culture (Viega, 2013) are less relevant to our present investigation.

In a separate report of outcomes related to our study, Rap&SingMT appeared to have a beneficial effect on emotional wellbeing in particular, with adolescents primarily expressing social concerns without making use of crude speech or lyrics (Uhlig, Jansen, & Scherder, 2017). Our intervention offered music as a motivating engagement strategy for effective self-regulation with rewarding efforts – a preventive music therapy approach (see study protocol, Uhlig, Jansen, & Scherder, 2015). Since emotional wellbeing and mood disturbances might affect sleep (Gregory & Sadeh, 2012), the main goal of the present study was to examine whether Rap&SingMT would exert a positive effect on sleep in adolescents.

Methods

Design. This study was designed as a single-blind cluster randomized controlled trial with waitlist control, and is part of a larger study. Results of that larger study concerning psychological wellbeing are published elsewhere (Uhlig et al., 2017). The music program offered in this school provides various music experiences for all adolescents enrolled in eighth grade (n=250). Two classes who received individual instrumental lessons (n=60), were excluded from our study. The remaining six classrooms (n=190) were offered the opportunity to participate in the study, with the first classroom (n=30) serving as a pilot. Data from the pilot study was not included in the final analysis. Five intact classrooms were randomized to receive either Rap&SingMT or a waitlist control condition. Only adolescents whose parents/caregivers consented to data collection were included as participants in the study, though all remaining adolescents in each class could participate in the assigned Rap&SingMT or control condition.

Randomization. An independent researcher of VU University Amsterdam, the Netherlands, generated the randomization sequence and blindly allocated the five classes in our randomized trial. Each intact class had approximately 30 students. Three classes were allocated to the experimental condition and two to the control condition, resulting in an unequal randomization ratio of 2:1.

Participants. Adolescents in eighth grade at a Jena-plan public primary school participated in the study. The experimental group consisted of 52 adolescents, aged 8-13 years; and the control group consisted of 23 adolescents, aged 9-11 years (see Figure 1 for study flow chart). The Jena School is a system, centered around concepts of learning through self-discovery within a community. Different age-groups work together within an integrated curriculum, and practice dialogue, play, work and celebrate, in one class. The participants of the experimental group participated in Rap&SingMT sessions, whereas the control group received several types of additional activities, with the exclusion of music.

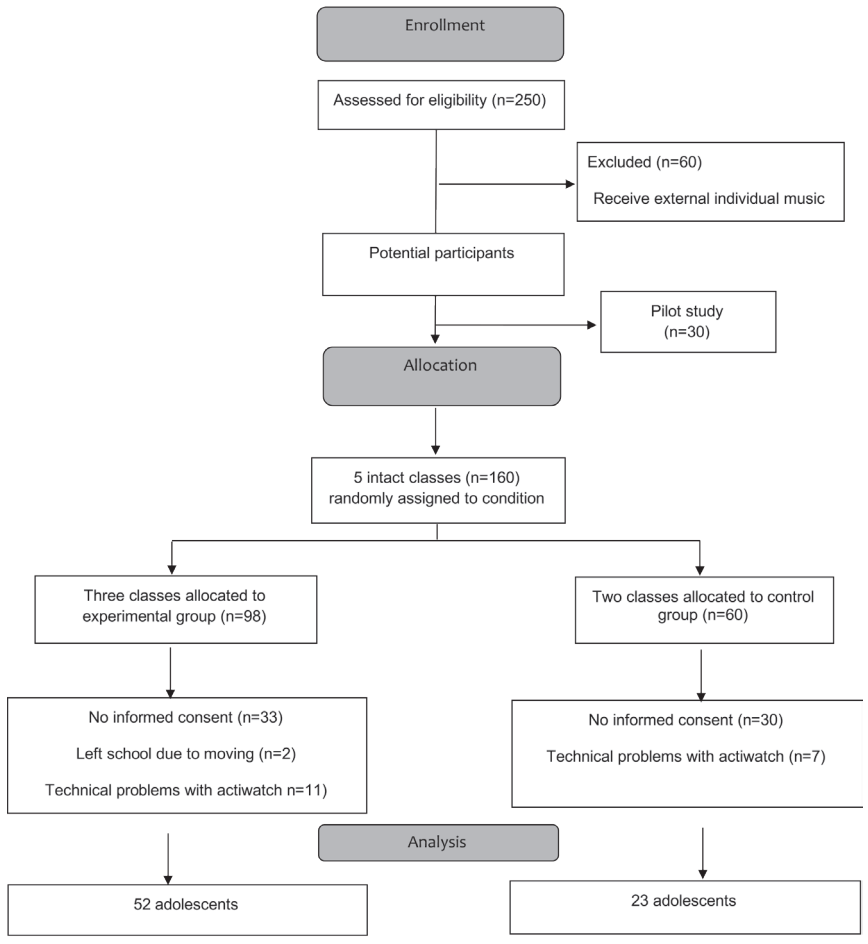

Figure 1. Flow Diagram cluster RTC Rap & Sing MT investigation sleep measures (adjusted)

Previous music education. Parents were asked about their adolescents' previous musical training outside of school, e.g. private music lessons. The reported months of training did not yield differences between both groups, with an average of 10.83 months (SD = 13.55).

Ethical approval. Ethical approval was provided by the scientific and ethical review committee of the Vrije Universiteit Amsterdam. The head of the Jena-Plan-School in Nijmegen granted permission to perform the RCT during regular school hours. Parents/caregivers were extensively informed about the study and gave their permission prior to research activities, by signing an informed consent on behalf of participants younger than 12 years of age. Adolescents of 12 years of age and older, co-decided with their parents about their participation.

Materials and procedure

Sleep

Various sleep parameters were indirectly assessed by Actigraphy. Actigraphy measures the circadian rest-activity rhythm by an Actigraph (Van Someren et al., 1998). The Actigraph is also called Actiwatch, because it is worn as a 'watch' around the wrist (Actiwatch 2; Philips Respironics, Murrysville, PA, USA). The Actiwatch was attached to the wrist of the non-dominant hand, to obtain a reliable recording of activity levels based on acceleration and to avoid interference from movements such as writing. The accelerometer of the Actiwatch detects movement of the arm as an accelerating force and generates an electrical current. More acceleration creates more force and subsequently generates a greater current. The current is then digitized into activity counts per one-minute epochs and stored in the internal memory of the device.

The Actigraph registration took place for a period of 4 days (24 hours), during a school-week, directly before and after the intervention period. A minimum of four/five nights is required for reliable sleep measures (Acebo et al., 1999); daily Actigraphy data were not included in the analysis. Six sleep variables could be assessed, i.e. *total sleep time* in minutes, *sleep efficiency* (percentage of sleep), *average length of sleep episodes* in minutes, and measures of wake behavior, i.e. *onset latency* in minutes (time before falling asleep), *snooze time* in minutes, and *wake time* percentage.

Intervention

Sixteen Rap&SingMT sessions, 45 minutes per session, were offered during school time to all adolescents within each classroom assigned to the intervention, once a week over a period of four months. This approach roughly equates with other school prevention studies (Calear & Christensen, 2010). The Rap&SingMT was led by two music therapists, and the control condition by two classroom teachers. The control group was informed about their waiting status, and received the same Rap&SingMT six months later. During their waiting period of four months, two classroom teachers performed additional activities per class, applying self-decided, varying school themes, e.g. language, math or games and art – but no music - within their multi-age (sub)groups. Rap&SingMT interventions started in large groups, and split after 8 weeks into two subgroups of 15 adolescents per class (randomly separated by classroom teachers). During the later 8 weeks within a 16 week period, the subgroups worked with one therapist, focusing on the development of individual and group rap themes and songs of adolescents, as well as preparing them for audio and video recordings.

Procedure

Music therapists. The qualified music therapists were trained to engage the adolescents in Rap&SingMT, and underwent internal evaluation and external supervision during the entire research process. These therapists did not participate in the testing, and therefore did not know which adolescents took part in data collection. The music therapists were also blinded to personal information about the participants.

Research assistants. The research assistants were trained Master's students in Clinical Neuropsychology (VU University Amsterdam), and were blinded concerning group participation. The assistants completed assessments before and after the sixteen weeks of music intervention and control condition. The assessment took about 30–40 minutes (for more detail see the study protocol, Uhlig, et al., 2015).

Data analyses

The SPSS-PC software was used for data-analyses. To test for age differences between both groups, an independent samples t-test was performed. A possible difference between both groups concerning gender was assessed by a Chi-square test of independence.

To examine the effect of Rap&SingMT on sleep, differences in sleep-wake measures between the experimental and the control group at baseline and post-testing were statistically tested by a repeated measures MANOVA with Group as between-groups variable and Time as within-group variable. In view of the explorative character of the study, we also performed univariate analyses of variance for the six separate sleep variables. Partial eta-squared estimations were used as effect sizes: small = .01, moderate = .06, and large = .14. Significance level was set at $p < .05$.

Results

Demographics

There was no significant difference between the Rap&SingMT (M = 10.08, SD = 1.23) and control group (M = 10.35, SD = 0.78) concerning age, $t(df = 64.19) = -1.15$, $p = .25$. Similarly, the number of males and females between the Rap&SingMT and control group did not differ significantly, χ^2 (df = 1, continuity correction) = 1.04, $p = .31$.

Sleep

There was no significant Time × Group interaction effect, Wilks' Lambda = 0.88, $F(6, 68) = 1.55$, $p = .17$, partial $\eta^2 = .12$; and no significant Group effect, Wilks' Lambda = 0.91, $F(6, 68) = 1.17$, $p = .34$, partial $\eta^2 = .09$. However, the main effect for Time (pre/post) was significant, Wilks' Lambda = 0.51, $F(6, 68) = 11.04$, $p < .001$, partial $\eta^2 = .49$. Based on the latter finding and on the explorative character of the study, univariate analyses of variance were applied to the six sleep variables. A significant Time x Group interaction effect was observed only for Sleep Time, F (1,72) = 4.15, $p < .05$, partial $\eta^2 = .05$ (see Table 1; Figure 2). Inspection of mean scores revealed that sleep time decreased from baseline to post-testing in both groups, but more in the control group than in the experimental group.

Table 1.

	Rap&SingMT				**Controls**							
	Baseline		**Post-testing**		**Baseline**		**Post-testing**		**Group x Time contrast**			
Sleep variables	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**F**	**df**	**p**	**ES**
Sleep time	**491.68**	**40.21**	**479.47**	**35.84**	**497.50**	**24.68**	**468.11**	**35.98**	**4.15**	**1**	**<.05**	**.05**
Sleep efficiency	85.19	5.16	86.12	3.87	86.78	2.90	87.50	2.70	0.03	1	.86	.000
Sleep episodes	15.52	3.03	15.87	3.23	16.63	3.27	16.78	3.19	0.10	1	.75	.001
Snooze time	10.12	7.00	9.04	6.14	9.20	6.28	5.49	3.65	1.88	1	.18	.03
Onset latency	6.34	4.82	7.00	11.39	5.37	5.04	5.08	4.98	0.14	1	.71	.002
Wake percentage	11.41	3.01	11.36	2.97	10.92	2.50	10.70	2.71	0.12	1	.73	.002

Descriptives and univariate statistics of sleep parameters for Rap&SingMT and control groups. Note. Sleep measures in minutes except sleep efficiency and wake percentage (%). ES = effect size (partial eta squared).

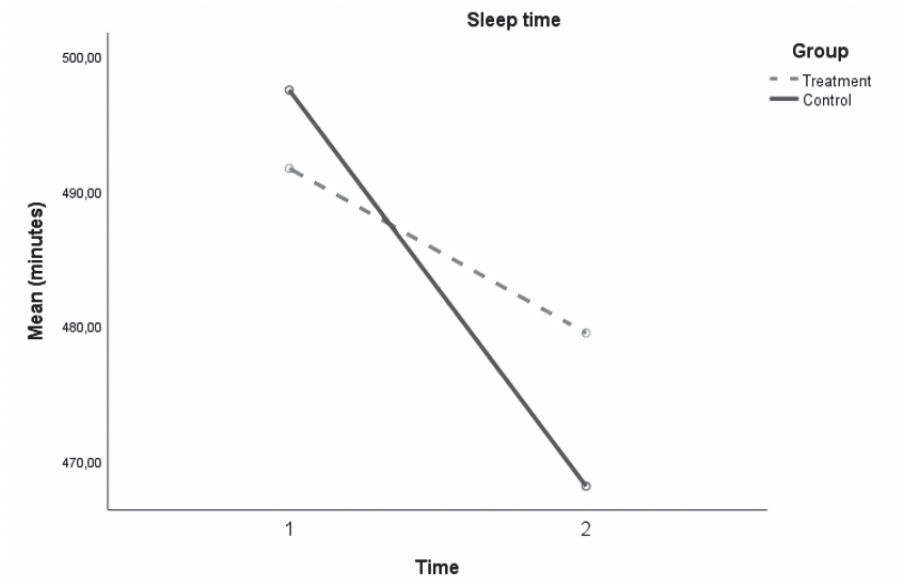

Figure 2. Graphic presentation of the scores on Actigraphy variable Sleep time, at baseline (1) and after a period of four months (2).

Although both groups did not differ in age, age does have a known relationship with sleep time (see Discussion). Consequently, we repeated the univariate analysis of variance for Sleep Time, with age as a covariate, resulting in F (1,72) = 3.38, p = .07, partial η^2 = .045. No significant interactions between Group x Time emerged from the univariate analyses of variance concerning the other 5 sleep variables.

Discussion

In the present study, it was hypothesized that Rap&SingMT would have a beneficial influence on the quality of sleep in adolescents, as our intervention appeared to have a positive effect on emotional wellbeing in the same group of adolescents (Uhlig et al., 2017). It is known that emotional wellbeing correlates positively to sleep (Gregory & Sadeh, 2012).

A repeated measures multivariate analysis of variance showed that, compared to the control group, the Rap&SingMT group did not have a beneficial influence on 'overall' sleep.

One explanation might be that our participants did not suffer from sleep disturbances, minimizing the chance for improvement. Indeed, in another study measuring sleep in normally developing children by Actigraphy (6-11 years old; Holley et al., 2011), total sleep time and sleep efficiency were nearly identical to our study. In other words, adolescents in our study slept about eight hours a night, with a high sleep efficiency of approximately 85%. Borghese and colleagues (2018) also used an Actiwatch (among other methods) to measure sleep efficiency in 10-13-year-old adolescents, a somewhat older group than in the previous study. The sleep efficiency of the adolescents was 88.7%. A recent review (Galland et al., 2018) confirms that a sleep time of 8.05 - 8.85 hours a night (approx. 485 minutes a night) is normal for the age group in our study. Also, the sleep latency of approximately 5.6 - 6.0 minutes observed in the present study falls within a normal range (Galland et al., 2018). Taken together, the results suggest that *at baseline* the adolescents in our present study show a normal sleep pattern.

In view of the explorative character of the study, univariate analyses of variance were also performed for all six sleep variables. Interestingly, a difference in sleep time appeared to occur in both groups during the four-month intervention period: all adolescents, irrespective of group participation, showed a decrease in total sleep time. However, the adolescents in the control group slept less than those in the experimental group at the moment of post-testing (see Figure 2). First, we address the finding that *both* groups showed a decline in sleep time. The four-month intervention period in our study took place between February/March (baseline) and June/July (post-testing). The latter period is at the end of the school year, a period in which adolescents may become progressively restless (Oliver & Reschly, 2007). The periods in which the baseline and post-testing took place also reflect the winter and summer, respectively. It has been observed that sleep time declines during the summer compared to the winter (Nixon et al., 2008). In that study, seven-year-old children slept 40.5 minutes less in the summer than in the winter (Nixon et al., 2008). Others state that sleep time in the winter is about 53-56 minutes longer than in the summer (Yetish et al., 2015). An explanation for this finding is that the wake time is earlier and the sleep onset time is later in summer than in the winter (Yetish et al., 2015). According to these authors, a cooler temperature and later appearance of sunlight in the winter promotes sleep duration.

Finally, we briefly discuss the finding that, towards the summer, the Rap&SingMT group showed a less pronounced decline in sleep time than the control group. The observed effect of Rap&SingMT on sleep time should be considered

with caution, because whether this decline reached the level of significance appeared to depend on whether or not age was included in the data analysis. On the one hand, the two groups did not differ in age (see demographics), justifying the choice to exclude age as a covariate. In that case, the difference in the decline in sleep time between both groups was significant ($p < .05$), with a moderate effect size. On the other hand, it is known that age and sleep time are related. For example, at age 13 average sleep duration is 8.5 hours, decreasing to 7.3 hours at age 18 (Maslowsky & Ozer, 2014). A decline in sleep time has also been observed in another study: from 9 hours 26 minutes at age 11 to 7 hours 55 minutes at age 15 (Leger et al., 2012). Including age in the data analysis resulted in a trend in the decline in sleep time for both groups ($p = .07$), with a moderate effect size.

As described in earlier work, we did observe improved emotion-related measures of Rap&SingMT, i.e. a significant positive effect on emotional wellbeing in this same group of adolescents (Uhlig et al., 2017). Indeed, there is ample evidence that music may improve emotional wellbeing (Daykin et al., 2018). Subsequently, enhancing emotional wellbeing was found to have a beneficial effect on total sleep time in adolescents, among other effects (Hendricks et al., 2014). In that study, however, the intervention was not music but cognitive behavioral therapy. Music therapy studies emphasize emotional wellbeing by the identification and processing of adolescents' themes and challenges through the motivating use of rap music (Hardley & Yancy, 2011; Viega, 2013). In fact, the effect of music therapy on emotional wellbeing, and subsequently on sleep, has not been examined before. In the present study we therefore aimed to examine the effects of Rap&SingMT on sleep in adolescents.

Limitations

Our present study encompasses several limitations. First, the intensity of the music intervention program might have been too low (45 minutes, once a week) to exert a positive effect on the various sleep variables, particularly since the adolescents did not really suffer from sleep disturbances. For example, music therapy studies also describe effective music interventions for children and adolescents (as a treatment for identified developmental problems/delays) with a duration of 20-30 minutes per session, two times a day, during 12 weeks (Treurnicht Naylor et al., 2011). A second limitation might be that, although the music therapists were very well trained to guarantee that the Rap&SingMT and control interventions were executed as standardized as possible, individual adjustments to their working style cannot be ruled out. Those individual differences might have influenced the findings in uncertain ways. Finally, we only applied Actigraphy to assess sleep in adolescents. However, Actigraphy assesses sleep *indirectly*, by measuring the rest-activity rhythm. We did have sleep logs for most of the adolescents, which were used to set bed/wake-up times manually in case of the Actigraph showed technical issues. However, the sleep logs proved less informative than the Actigraphs, which also holds for other studies. For example, it has been observed that parents overestimate sleep time with approx. one hour in children, aged 7 years (Nixon et al., 2008).

Conclusion

The adolescents in the present study did not suffer from sleep disturbances. Rap&SingMT did not yield positive effects on 'overall' sleep in adolescents. Cautiously, the results however suggest a moderate positive effect of Rap&SingMT on sleep time.

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Yo Yo Yo.
Dance if ur happy.
Dance if ur mad.
Dance all the time.
Dance when ur sad.
If you don't know what to say.
If you don't know what you feel.
Dance the day away.
And your happiness will be real.[20]

[20] American English translation of the original Dutch group rap, created by adolescents during the performed Rap&SingMT, Dutch lyrics: Yoo, yoo, yoo, shake als je blij bent, shake als je boos bent, shake de hele tijd, shaken - tot in de eeuwigheid. Shaken is je leven, doe niet raar en vergeet het maar, met shaken kun je emoties uiten, en ook weer sluiten. Met shaken kan je emotie uiten, met shaken wordt je blij, shake, shake, shake je emoties los, en dan wordt je blij.

Chapter 7

Summary and Discussion

Summary

Summary of main findings

This dissertation studied the effects of an age-appropriate music therapeutic intervention on the development of self-regulative skills of adolescents. The intervention, Rap&SingMT, aims 1) to enhance the well-being of adolescents, 2) to reduce their potential development of problem behaviours, and 3) to establish the power of music therapy in a non-clinical, educational setting. The main results are summarized and discussed below, followed by formulations of perspectives for future research.

In the Introduction, **Chapter 1**, we presented a study about adolescents and explored their emotional demands and needs, such as support for self-regulation and coping capacities. Despite a general familiarity with the leading global mental problems of young people – depression, suicide and violence – the majority of these problems go unrecognized. This illustrates the enormous costs of mental health, which are 10 times higher for people who develop antisocial behaviours in childhood than for those whose problems surface later in life. Hence adolescent burdens require adequate responses, such as offering early school intervention programmes and investing in quality of life to improve their well-being. Music therapy programmes can offer music as a motivating engagement strategy for effective self-regulation, with rewarding efforts. The results from our systematic literature review illustrate the difficulties of fully understanding the rewarding efforts of music (Uhlig, Jaschke, & Scherder, 2013). Music appears to have self-regulative capacities for youth, but there are only a few convincing studies. Adequate and generalizable applied music interventions of actively listening to, singing and playing music are mostly for children. Studies about the effects of music on emotion regulation commonly involve young persons, such as university students of middle-class social and economic backgrounds, who were mainly assessed after they had listened to music privately. Representative samples of group music applications for youth at school with self-regulative purposes are rare or just newly developed (*Tuned In* programme).[21] Similarly, preventive music therapy initiatives have recently been tested internationally on non-clinical and large educational settings. Due to the limited research the potential of music and music therapy in schools is rarely acknowledged as a valuable instrument for emotional regulation or as a natural health-promoting tool to increase or restore youths' well-being.

[21] The *Tuned In* programme shows promise as a brief emotion regulation intervention using music listening for adolescents; these findings extend to an earlier study with young adults (Dingle, Hodges, & Kunde, 2016).

Chapter 2 reports on a survey among music therapists mapping their experiences with a wide variety of applications of rapping and singing interventions for regulative purposes in clinical settings for youth. With these applications music therapists generally observed changes in three domains: emotional engagement, cognitive functioning and sense of self. Additionally, during the music therapy process young clients appeared to grow more aware of the substantive content of their treatments, for example because they constructed personal and meaningful song lyrics, hinting at improvements in personal, cognitive and social insights. These reported experiences suggest that engaging emotionally and vocally in the music-making process helps young people enhance their self-regulative skills. The results of the survey thus provide scope for the further professionalization of music therapy: clients may benefit from more refined techniques for rapping and singing interventions, and well-defined interventions and approaches may support music therapists enhance their methods. These findings motivated us to develop a specific rap-and-sing training and to encourage music therapists and students to use specialized methods for engagement in order to optimally benefit from the hypothesized effect.

To this end, a study protocol (**Chapter 3**) was developed to conduct a randomized controlled trial (RCT) for the rap-and-sing intervention labelled Rap&SingMT[22] in large classroom settings, and to substantially contribute to insights on its application. In this chapter the operationalization of the musical concepts is explained, and the expectations for their effects on emotion regulation, executive functions and rest-activity rhythm (sleep) monitoring for well-being are formulated. The protocol elaborates on the main concepts of the intervention, i.e. rhythm, vocalization and verbalization, and the way in which they are embedded in the context of the therapeutic approach. Key to the intervention is that it allows the music therapist to explore the role of rhythm and speech (rhyming words) and melody in singing, and that together all offer the client the opportunity to express both joyful and uncomfortable feelings. In line with an approach from cognitive behavioural therapy and psycho-education, the intervention also facilitates coping through the identification of personal and peer themes, thereby promoting well-being. Apart from the data collection on variables for well-being (emotional, cognitive and sleep behaviour) in the formal RCT protocol, we also studied the lived experiences and reflective insights of music therapists and adolescents during Rap&SingMT.

[22] The former name RMT (RapMusicTherapy) was changed into Rap&SingMT during the process of developing our study protocol. RMT gives rise to a potential misunderstanding because of its abbreviation for 'Regulative Music Therapy', which refers to a different method.

This latter phenomenological approach required data collection and qualitative interpretation of attitudes and values of music therapists (by way of a survey), as well as observed motivations and experiences of adolescents (by way of interviews and videos).

Chapter 4 reports on the results of the RCT protocol. The chapter presents the 'overall benefits' of psychological well-being of adolescents in emotion regulative subjects, which decline by a modest yet significant *total problem score* of SDQ and DERS on all measures produced by teachers, parents and adolescents. Specifically, while there was an increase on these problem measures for the control group, Rap&SingMT yielded a significant different effect: on the SDQ scales a stabilization of emotional symptoms and hyperactivity/inattention, and on the DERS scale a stabilization of difficulty engaging in goal-directed behaviour when distressed. Other measures yielded no significant differences. In contrast to significantly higher problem scores in the control group as indicated by teacher measures and non-significant yet also higher problem scores by parent measures, the Rap&SingMT intervention group yielded a stabilization over time between pre- and post-measurements. Assessments of the positive self-perception scores (which do not focus on problems) of adolescents were non-significant in both groups. However, our adolescents expressed difficulties translating their personal – primarily pre-verbal musical experience – into verbal answers because, in their own words, the items included in this questionnaire were 'not connected to the music'.

In **Chapter 5** we studied the effect of Rap&SingMT for adolescents on measures of executive functions: inhibition, planning and working memory. The results revealed no significant effects on tasks, performed on iPads. One of the tasks (Stop-Signal test) suffered from technical problems, forcing us to partially exclude datapoints and thereby compromising sample sizes and power. Despite this lack of quantitative power, a qualitative video assessment of the intervention sessions allowed us to investigate executive functions from another angle. These video micro-analysis observations yielded a selected total of 76 minutes of relevant *music moments* (interactions between therapist and adolescent that were mainly in the musical domain) during our Rap&SingMT sessions. The analysis showed that those musical interactions – ongoing music without spoken words – took place for only a limited amount of time, with an average of 15 minutes per session. During these Rap&SingMT interactions adolescents strongly engaged in e.g. rhythmic movements with increased rhythmic bodily activity. While involved in those musical moments, observations indicated heightened attention of adolescents with decreased distracting gestures and movements. Those observations give rise to the assumption that the entire group was engaged in the *flow*[23] during the music process, which suggests a momentary and localized improvement of executive control.

Chapter 6 examined the effects of the Rap&SingMT intervention on sleep in normally developing adolescents. Using actigraphy to monitor rest-activity rhythm (indirect measure of sleep), our Rap&SingMT group did not yield significant improvements compared to the control group. In both groups the sleep variations of adolescents seemed to follow natural fluctuations between parameters (total sleep time, sleep efficiency, average length of sleep episodes, measures of wake behaviour, onset latency, snooze time, wake time percentage). The sample yielded generally healthy sleep efficiency of around 85% of sleep per eight hours of sleep a night, and did not suffer from sleep disturbances. However, a decline in total sleep time over the experimental period of four months was lower in the Rap&SingMT group than in the control group. Whether this declined impact on sleep – in the context of a seasonal change from winter to summer – in the Rap&SingMT group could be related to the intervention experiences remains unclear.

General Discussion

This thesis is the first study in a school setting on the effect of a rap-and-sing intervention on the development of self-regulative skills of adolescents. No specific evidence on the effectiveness of such a music therapy intervention was found before the start of the study. Reasons for a lack of studies are manifold: music interventions are inherently complex and therefore difficult to control experimentally. Experiences of adolescents are plural and variable by nature. Also, music therapists' approaches vary enormously, including their skills and preferences in handling musical containment, e.g. allowing emotions to occur and channelling them appropriately during therapy. This plural diversity is extremely challenging for research, and it is in this context that the main findings for this dissertation, presented below, must be approached with caution:

Rap-and-sing intervention enhances well-being. The results of our effect study and the survey (Chapters 2 and 4) underscore the versatile application of these and similar rap-and-sing interventions for enhancing emotional well-being for youth. Stimulating the interaction of adolescents with music and supporting

[23] 'Flow' moments can lead to enhanced action awareness, improving momentary executive control, as is common during music performance (Chirico, Serino, Cipresso, Gaggioli, & Riva, 2015). 'Flow' in Rap describes all of the rhythmical and articulative features of a rapper's delivery of the lyrics (Adams, 2009).

them to word their feelings into lyrics appear to be essential emotion-regulating aspects of this intervention. In line with research on strategies of emotional regulation, the mediating role of the music in this process depends on how each adolescent is individually engaged (Chin & Rickard, 2014). Insight into adolescents' 'lived musical experiences' should therefore be gained by interviewing them about their different Rap&SingMT experiences and learning 'how' the music might affect them from an insider's perspective. To this end, after four months of Rap&SingMT adolescents were debriefed, and their accounts indicated that the majority was more 'engaged in their emotions', some had developed 'self-knowledge', and one pupil called it 'being free to speak out'.[24] They reported positive experiences with Rap&SingMT and felt more able to self-reflect, but still experienced difficulties expressing their emotions in words. Their learning experiences pertained to their engagement in creating rhymes, lyrics, songs and rap improvisations, as well as discussing personal and peer themes in the group and collaborative successes such as finally agreeing about a group-rap song after lengthy discussions. This points to self-regulative engagement during the Rap&SingMT intervention and to improved self-regulative skills (see Chapter 2), as reflected in declined total problem scores of all emotion-related measures (SDQ, DERS; see Chapter 4). Hence the combined image that arises indeed suggests that adolescents' well-being is enhanced because of their improved self-regulative and emotional skills, but the pattern of causalities appears complex and requires further research.

Risks of developing problem behaviours. The present findings reflect a desire of adolescents to identify personal and peer themes related to coping and fostering well-being. This is a common pattern of clinical research on rap interventions for youth populations with behavioural problems (see Chapter 2; Hardley & Yancy, 2011; Plener, Sukale, Groschwitz, Pavlic, & Fegert, 2014; Viega, 2013). The present research validated the substantive themes adolescents engaged with, and corroborated the notion of behavioural regulation by helping adolescents express their feelings in a group setting (see Chapter 4).

[24] Dutch quotes taken from interviews four months after Rap&SingMT translated by SU (follow-up study in preparation, not included in this dissertation. We developed an interview guide, applied a narrative analysis of the conversations, and used encoding format to differentiate contents of interviews into WAT (what), WIE (who) and HOE (how), performed in Atlas.ti.).

The rap lyrics contained peer-related themes at school (e.g. bullying) and showed that the topics of friends and friendships were key. Indeed, such social connectedness has been shown to be a protective factor against serious psychological and social problems in adolescence (Strunk, King, Vidourek, & Sorter, 2014). As was shown in our preamble case of Richard,[25] his self-written lyrics helped him to (re)discover the social connection with his classmates, school and home community over time during the therapeutic relationship. By recognizing him as a person yet not overemphasizing his disturbed emotions, the music-therapeutic interaction not only addressed individual problems but fostered nourishing relationships with others, ultimately supporting the regulation of his behaviour. Especially with high-risk or vulnerable clinical groups, specialized music therapy strategies and well-developed therapeutic skills are required to build such relationships and strengthen youth's capacity for coping (Alemán et al., 2016; McFerran, 2016).

Recent studies on evidence-based programmes for violence prevention in schools reveal similar engagement strategies for adolescents, focusing on negative themes such as victimization, sexual intimidation, anger and conflict management skills (Strunk et al., 2014). These programmes are successful in developing responsibility for proactive engagement in mental health, like sharing feelings and listening to and supporting each other, but generally lack opportunities to practice these developed skills (Finkelhor, Vanderminden, Turner, Shattuck, & Hamby, 2014). By contrast, our study illustrated integrated ways (use of rhythm, rhyme, lyrics, movement and discussion) to practice psychosocial skills during rap-and-sing interventions in group music therapy. Within our non-clinical population we identified and reported on difficult-to-manage emotions (lyrics), developed working alliances, and addressed personal and peer themes to support coping and well-being skills in school and community. In a more playful sense, pupils could also release energy and have fun with body percussion and physically rhythmic group activities. In short, we studied music therapy strategies within a healthy school environment (Chapter 4), and offered partial insight on vulnerable, clinical groups of youth (Chapter 2). A longitudinal assessment is nonetheless needed to shed light on the long-term effects of Rap&SingMT on coping and well-being skills and to affect developing problem behaviors.

Music therapy in a non-clinical school setting has a lower participation threshold. Rap&SingMT met adolescents at their heightened emotional reactivity, sensitivity to peer influences and impulsivity (see Lee at al., 2014) and helped

[25] See preamble of this dissertation, the case of Richard.

unfold their still-developing self-control capacities. Music therapy is less prone to effects of stigmatization than verbal psychotherapy, which is sometimes associated by the general public with having 'mental problems' or 'pathology'. Moreover, music therapy offers an inclusive focus on for example emotion regulation/dysregulation combined with motivating and pleasant effects of music, which yields lower thresholds to participation and therefore can make activities more attractive than other, problem-focused school programmes.[26] Adolescents often fear a stigma of having mental problems, but may feel encouraged by the real-life stories of others to seek support, resonate with those cases, and learn how and what to exchange by developing self-efficacy (Strunk et al., 2014). Moreover, problems are even aggravated when adolescents shy away from asking support from peers or adults, as they often develop less positively involved – and cynical – behaviours; this applies particularly among adolescents from age 10 (Finkelhor et al., 2014). Our study therefore aimed at motivating the adolescents of this age group to identify and discuss emotional or social themes. Sensitive personal and peer subjects such as bullying, unacceptable discrimination and a felt need for self-protection were addressed in the sessions. Those topics were combined with individual and group music preferences, which are strongly related to social identities. We explored those emergent themes and mirrored existing song lyrics related to specific attitudes and behaviours. All pupils (also the shy ones) were invited to practice their created lyrics while the group musically contained them; this embodied a confronting as well as rewarding experience. These activities seriously called on adolescents to voice their lived stories and to transform resistance, fear or shyness into rap songs. In conclusion, we offered both a structured *and* a pleasant music programme that formed a psychologically safe place in-between free improvisations and the development of psychosocial skills, as meantioned by McFerran and Wölfl (2015). The emphasis should thus lie on crafting, prolonging or intensifying such proactive interventions, as is the case with motivating and rewarding music therapy programmes in schools.

Testing a protocol of Rap&SingMT. Applying Rap&SingMT was challenging, as there was no comparable music therapy research available. Our multi-testing design revealed significant benefits on psychological measures (Chapter 4) but not on executive functioning or sleep measures (Chapters 5 and 6). Our expectation was that active engagement in rapping and singing would

[26] Aggression, an often-discussed subject within schools, is currently being addressed by German and Australian music therapy initiatives, which offer anti-violence programmes by working with entire classes with a high level of violence (McFerran, 2016; McFerran & Wölfl, 2015).

stimulate a bi-hemispheric network, affecting cognitive as well as personal and social needs correlating to well-being and sleep in adolescence. Despite the positive relation on the assessed emotional and self-regulated behaviours (Chapter 4), we were unable to establish a *far* transfer from the effects to the integral pattern of cognitive skills and sleep behaviour (Chapters 5 and 6).

From another viewpoint, our findings resonate with music studies in adolescence, which require prolonged exposure to music interventions for more than one year for observable effects (Alemán et al., 2016; Kraus et al., 2014c). These studies indicate that music training during adolescence accelerate neurodevelopment (Tierney, Krizman, & Kraus, 2015) and that synaptic pruning and neural restructuring are still developing in brain areas involved in cognition (Krizman, Marian, Shook, Skoe, & Kraus, 2012; Tierney et al., 2015). Moreover, enhanced neural processing of sound, e.g. to improve language, involves auditory skills improvement through long-term musical training, particularly during the teenage years (Tierney et al., 2015). In music research the developing adolescent's brain reflects these results (Slevc et al., 2016; Moradzadeh, Blumenthal, & Wiseheart, 2015): short durations of interventions echo insufficient time for changes in neurological and thus also emotional and cognitive domains (Alemán et al., 2016). Nevertheless, the different skill domains as included in our study – sustained attention, ability to switch, awareness of sound and language (by developed rhyme-rap lyrics) and rhythmic movement skills – form complex dynamic processes. They are inherent to *dynamic* music group participation, given that music needs to be understood as related to human sensorimotor synchronization processes (Clayton, Sager, & Will, 2005; Goebl & Palmer, 2009). Those domains of musical skills are notoriously difficult to study, the more so because music is not universal in its regulative effects on emotional and cognitive skill improvements: its potential is mainly unleashed when it matches the interests and preferences of the individual, especially in adolescence (McFerran, 2016).

Limitations and strengths

The limitations and strengths of this study are discussed in light of future applications of music therapy in non-clinical school practices. To our knowledge, this study is the first to investigate the subject of rapping and singing in music therapy for emotion regulation in a school group setting: no comparable research has been found. We also developed, tested and applied the group Rap&SingMT for the first time, and the assessments of psychological, executive functioning and sleep measures gave rise to unexpected challenges and limitations during the study.

Limitations. Music therapy engagement is based on processes that involve a continuously changing interpersonal dynamic interaction, and therapists do adopt a flexible attitude and openness to what participants bring into the therapeutic situation (Gold, Voracek, & Wigram, 2004). Although we regard the present intervention as *music* therapy, our video analysis does indeed reveal the widespread use of verbalization during all sessions (70% of total session time), as a result of adolescents being invited to dialogue about their therapeutic themes (Tomlinson, Derrington, & Oldfield, 2011). This emphasis on verbalization lowered the amount of actual *musical* engagement of adolescents and may therefore have weakened any music-specific effects of the intervention. Furthermore, the pre- and post-test assessments in our study might not have adequately captured the many *dynamic* changes during the music-making process. In hindsight, analysis of the dynamic processes during our music performances might have yielded more ambiguous results, as the intervention involved flexible attitudes in practice. This conforms with other research showing similar effects of complex music interventions (Benz, Sellaro, Hommel, & Colzato, 2015; Lipszyc & Schachar, 2010; Tang & Schmeichel, 2014; Verbruggen & Logan, 2008). Since there is a complex mix of different types of stimuli involved during music processes (listening, singing, playing, as well as deliberating in our study), it is not uncommon for this to lead to methodological problems (Bowie & Harvey, 2006; Salthouse, 2011; Moradzadeh et al., 2015).

Further, it can be questioned whether the experiences that Rap&SingMT targets through cognitive effects such as entrainment can be directly translated into stable cognitive and verbal abilities, as measured by standardized tests. For instance, performing such EF tests (e.g. planning TOL) is not as motivating as making music and may therefore induce different mood states, brain activity and cognitive functioning (see also Mitchell & Phillips, 2007) than those induced in Rap&SingMT sessions. Standard questionnaires (SDQ, DERS, SPPC) may be less suitable than expected to verbally assess the music interventions; their reliability could be compromised for the age group under consideration because they tend to often change their opinions and tolerances (McFerran, 2016). Actigraphy measures for sleep efficiency or sleep time may have been unable to capture more daytime local and temporary changes in behavioural and social attitudes induced by Rap&SingMT (Kouros & El-Sheikh, 2015). The active phases of the day should be included, to target aspects like decreased fear responses (Albrecht & Stork, 2017). Further, actigraphy produces limited accuracy by only detecting wakefulness, like sleep disturbances, or improvement in sleep efficiency as opposed to wakeful relaxation, which relates to the difficult identification of specific *waking epochs* during sleep (de Souza, Benedito-Silva, Pires, Poyares, Tufik, & Calil, 2003). Total scores (SDQ) of teachers were significant, as they were positively involved by witnessing the group experiences of their pupils (Rap&SingMT and controls), which might have influenced their observer reliability. SDQ, DERS and SPPC data as well as the interviews are based on adolescents' self-reports, which could have been created as socially desirable responses from some participants. To conclude, it is possible for both the complex and dynamic mix of variables in the Rap&SingMT intervention and the combination of measurements to have led to limitations in the findings.

A methodological limitation of the present study is that our adolescents did not show deviant emotional disturbances, whereas the Rap&SingMT intervention was focused on improving psychosocial problems of adolescents (SDQ teacher score as indicator for problems). Our participant group yielded 6% fewer problems than the Dutch average, with only eight adolescents in each group (Rap&SingMT and control) showing borderline (8/10, boys/girls respectively) and problem scores up to 17 (scores of 12/14, respectively). As indicated by a meta-analysis of music therapy effects on children and adolescents with psychopathology (Gold et al., 2004), emotional problems and subjective feelings are more difficult to assess than overt behavioural and developmental problems. The participants yielded norm scores on both emotional and behavioural problems (SDQ/DERS scales) and formed a significantly stabilized Rap&SingMT group compared to controls. We did not find a beneficial influence of Rap&SingMT on executive functions (EF), but our adolescents did not show an impairment in EF either. Similarly, the generally healthy adolescents yielded a high sleep efficiency of around 85% of sleep per eight hours a night. In conclusion, those norm score results attenuate the chances of detecting an observable improvement in SDQ, EF and sleep behaviour caused by the Rap&SingMT.

The short Rap&SingMT cycle of 45 minutes once a week over four months and our lower number of sessions (due to days-off at school) constitute another methodological limitation. Findings of Gold and colleagues (2004) indicate larger effects of music therapy with increasing numbers of sessions. More specifically, Spiro and Himberg (2016) show improved rhythmic interactions in songs as well as during improvisation between participants in later music therapy sessions. To specifically reduce internalizing problems for long-term emotional and behavioural adaptation processes, longer periods of time (9 or 12 months) of interventions and assessments are needed (Stockings et al.,

2016). The same amount of time is needed for repeated music interventions (at least 12 months) in order to accelerate neurodevelopment and to detect observable effects of music as a mediator of behaviour, EF and sleep measures (Jaschke, Honing, & Scherder, 2018; Tierney, Krizman, & Kraus, 2015). Finally, our current short-term intervention appeared to be unsuccessful in *defining* music's mediating role, e.g. for emotion-related subjects such as reward, and in *identifying* specific variables and their underlying mechanisms for beneficial effects, as necessary for an adequate investigation in an RCT (Kraemer, Wilson, Fairburn, & Agras, 2002).

A final methodological limitation is imposed by the restrictions in the permissions for data collection, leading to diminished methodological control in the design. The cluster groups for Rap&SingMT were randomly selected, yielding unequal sizes of participants per class and contributing only to individual assessments and not allowing group or cluster analysis (see Chapter 6). A larger school sample would have been required to reach adequate sample sizes for clusters (Garson, 2008, 2014). Our findings cannot be generalized to other schools or geographical locations, as we investigated our Rap&SingMT for the first time among a small group of participants and have not assessed the impact of our multiple-testing design or conducted a long-term follow-up study.

Strengths. The main strength of our randomized single-blind controlled trial is that researchers were blind to all individuals who actually partook in data collection of the participating groups; this is the highest form of methodological control while testing hypotheses for effective mechanisms. Besides this rigorous testing procedure, another strength of the present study is the addition of qualitative data – adolescents' rap lyric examples reflecting their personal and group involvements and debriefing interviews, leading to insights on the adolescents' lived experiences of the interventions and of their life-world. Related to our modest but stabilized emotional measures of well-being, we contend that Rap&SingMT could have contributed to the everyday functioning of adolescents as a positive school engagement strategy without stigmatization – and integrated into a daily school routine – as needed and addressed by Inchley and colleagues (2016). Our complementary outcomes (rap lyrics, conducted interviews and video micro-analysis) yielded results and insights by way of triangulation.[27] Single testing of the effects of our music therapy on executive functioning and sleep measures did not show transfer of benefits, but the forthcoming integration of our quantitative and qualitative research methodologies does yield some new ideas. To further develop these insights as well as focus on new research, we build on the insight that Rap&SingMT is a suitable group music therapy application for schools.

[27] Referring to the application and combination of several research methods.

> "If parents and teachers would know how much easier it is to educate children [& youth[28]] who are disciplined through music making – the whole world would be full of children [& youth[28]] choirs."[29]

Research agenda

Despite its methodological limitations, the general conclusions of this study refer to the potential of Rap&SingMT and similar interventions as music therapeutic strategies to support adolescents' emotional and psychosocial well-being skills. As has become obvious further research is needed, and below we sketch four themes around which a research agenda should be built.

1. Methodological themes in music education & therapy research

Multidisciplinary approach. The present study reflects a broad perspective to assess and conceive of music as a *holistic* encounter[30] for young people. According to Maric (2017), those broader perspectives are currently required for youth investigations to bridge the gap between research and practice and to better assess individual effects. Elaborated single-case studies as well as a mixture of qualitative and quantitative assessments are needed to differentiate between objective and subjective aspects of group and individual ability development (Maric, 2017). Additionally, to better connect practitioners and scientists for collaborative tasks in present-day youth research and to embrace communal impacts (e.g. in schools), multidisciplinary approaches are indeed

[28] SU

[29] Quotes of Kurt Masur: http://www.pacificboychoir.org/choir/quotes

[30] In this study, in relation to complete systems rather than only to the analysis of this treatment, we also included unexpected experiences.

required for both clinical and non-clinical settings (Clark & Harding, 2012; Maric, 2017; Saarikivi et al., 2016; Swaminathan & Schellenberg, 2016).

Collaboration for better quality of music interventions. Broader perspectives necessitate collaboration between the different fields, in our case between music education and music therapy in particular, to invest in the well-being of adolescents at school. Improving the quality of music studies is needed at this time (Dumont, Syurina, Feron, & van Hooren, 2017; Robb, Carpenter, & Burns, 2010; Robinson, 2015), as well as investing in the professionalization of and collaboration between educators and therapists in schools.[31] Music professionals (teachers and therapists) should be able to routinely apply existing guidelines, such as categorization tables, to co-design specific protocols for individuals as well as small or large group settings embedded in schools and clinical environments that could be assessed longitudinally (Carr & Wigram, 2009), thereby allowing for monitoring long-term effects of the interventions. Current music interventions present heterogeneity and cause such variability in the effects of their studies that they might not be appropriate for a meta-analysis (Yinger & Gooding, 2015). Hence more methodological accuracy is needed (Dumont et al., 2017).

''If every school would hire two more music teachers [therapists[32]], we would need two fewer police officers."[33]

[31] As an extension of this study we initiated the development of a shared music research consortium at VU Amsterdam, to combine as well as to collaborate with the various music research activities in the Netherlands. We developed music reaserch related methodological items to stimulate the improvement of its quality, like the use of a music assessment scale called *Musiquas* (Jaschke, Eggermont, Uhlig, & Scherder, 2018). We also host a summerschool every year around these topics and invite particpants to exchange their knowledge and ideas.

[32] SU

[33] Quotes of Kurt Masur: https://www.azquotes.com/quote/1366212

2. Music in schools

Bridging between music education and therapy. Schools are perfectly suited to support musical activities in whatever personal or social context children and adolescents choose to engage (Lamont, Hargreaves, Marshall, & Tarrant, 2003)[34]. Music interventions are generally applied for stress reduction, e.g. listening effects physiological arousal (e.g., heart rate, blood pressure, and hormonal levels) and psychological stress experiences (e.g., restlessness, anxiety, and nervousness) (de Witte, Spruit, van Hooren, Moonen, & Stams, 2019).

Individual and group music-making (educational and therapeutic) require the expansion of creativity and facilitate self-expression; both are beneficial to the development of social skills and efficient for health and well-being (Benz et al., 2015), community cohesion and society as a whole (Hallam, 2010).

Music therapy intervention. Besides music lessons at school, music therapy can be offered – especially as non-invasive and non-judgmental active music-making – to provide children and youth with opportunities and capacities that may otherwise stay latent (Gold et al., 2004). Depending on each community's needs, specific music therapy interventions could facilitate the early development of self-expression and affect-regulation skills during the heightened emotional reactivity of adolescence. Such community music therapy programmes, as practiced in German, Australian and British schools (Nöcker-Ribaupierre & Wölfl, 2010; McFerran & Rickson, 2014; McFerran & Wölfl, 2015; Tomlinson, Derrington, & Oldfield, 2011), can offer support to build healthy relationships, which is related to adolescents' strong need for social acceptance and their sensitivity to rewards (Griffin, 2017).

''We are a musical species as much as we are a linguistic one''[35]

[34] There is a Dutch intiative to apply more 'More music in class' in 2020 (Méér Muziek in de Klas).

[35] Both Patel (2008) and Sacks (preface, 2011) refer similarly to the close relationship between music and language: 'We humans are a musical species no less than a linguistic one' (Sacks).

3. Vocalization in schools

Vocalization, rhyme and vocabulary learning. The support that music offers for learning is related to both education and therapy.[36] The complex act of vocalization, as investigated during our rapping and singing intervention, has much potential for both practice and research (see Elmer, 2011). Vocalizations could be seen as *intensifiers* for speech, reading and spelling, and as a step in the creation of language (Patel, 2008a,b). Experiencing rhyme, alliteration and rhythmic language (perfect rhythmic timing naturally exists in poetry and singing) is developmentally important (Goswami & Bryant, 2016, xxi). A neural 'orchestra' is at play during rhythmic engagements – brainstem, motoric and somatosensory areas, cerebellum, insula and anterior cingulate cortex – whereas more complex activities like irregular rhythmic singing also include the orbitofrontal cortex (Jungblut, Huber, Mais, & Schnitker, 2014), an essential area for self-regulation that is in development during adolescence (Lee et al., 2014). This potential for adolescents notwithstanding, most integrated methods to improve reading and language development – through rhythm, rhyme and phonological learning – are generally only applied on children (Goswami, 2002).

Vocalization for language improvements. Phonological (and rhyme) awareness is also a longitudinal predictor for learning foreign languages because it helps restructure lexical processes (Kirby, Desrochers, Roth, & Lai, 2008)[37]. Metric or consonant rhyme-neighbouring words also affect phonological awareness, whereas experience with rhyme structure stimulates vocabulary development.[38] This is important when developing the ability to learn and read, whereas large and small units of orthographic representations can easily be learned by rhyme and singing (Goswami, 2002; Goswami & Bryant, 2016). Children's healthy language development starts by repeating 'non-words' aloud and continues from age 5 to increase vocabulary knowledge by 1000 words per year (this continues in adulthood when learning non-familiar words). According to Lee et al. (2007), an early start to developing this capacity to store new words is important for later stages, when this structure for vocabulary learning of combined phonological and semantical processes can be used[39].

[36] The music therapy case study at the beginning of this dissertation described the development of vocabulary and language through rap songs.

[37] See Salcedo (2010), The Effects of Songs in the Foreign Language Classroom on Text Recall, Delayed Text Recall and Involuntary Mental Rehearsal.

[38] After participating in our professional Rap&SingMT training course, Italian music therapists, also working as teachers in schools, used our rap-rhyming technique to improve their students' history skills in class.

[39] Specifically, a need for improvement: Dutch schools have presented alarmingly low reading skills for over 20 years (Inspectie van het Onderwijs. 2018. ['The State of Education' 2016-2017 in the Netherlands: Report]).

Hence vocal music processes can support this development, for struggling middle school readers (Biggs et al., 2008; Schön et al., 2008) and several early childhood populations (Knight & Rabon, 2017).

Vocalization and singing for well-being. Vocalization appears at all ages and in all cultures, and therefore suggests being less culture-dependent than speech, and differens from the verbal, more judgmental, dialoguge (Elmer, 2011). Group singing seems to demand a lower-than-normal respiration, and musical song structure appears to determine the heart rate variability of singers (Vickhoff et al., 2013). The tendency towards an entrainment effect between singers relates to heart rate acceleration and deceleration, which already appear when simply singing in unison. These synchrony rituals foster cooperation. Such guided breathing methods also have biologically soothing effects while benefitting cardiovascular functions (Vickhoff et al., 2013). Also, due to the relaxing effect of oxytocin the reduction of cortisol induces social interaction (flow) among participants during pre-composed and improvised group singing (Keeler et al., 2016). Research of the *Sing Up* initiative in the UK[40] showed a positive connection between singing and well-being in schools, and led to improved sociability as well as transformative change in the lives of young people, their self-concepts and physical benefits (Welch, Himonides, Saunders, & Papageorgi, 2010; Welch, Himonides, Saunders, Papageorgi, & Sarazin, 2014; McPherson & Welch, 2018). Vocal engagement in rhyme, rap or even choral singing could enhance learning, bonding and well-being while providing vocal identity as a powerful tool for (re)constructing male and female genders (Sweet, 2010). Thus as music supports the development of youth in many ways (Engh, 2013), the soothing effects of singing, the structuring rhythm in rhyme and the development of *vocal dialogue* should be integrated into daily school routines.

"I might be no body, but wait till I'm together like a symphony"#[41]

[40] The *Sing Up* initiative in the UK, started ten years ago and established as core part of the school curriculum, promotes group singing in schools for children and adolescents: https://www.singup.org/about-sing-up/

[41] Professional Rap quote of BurnedInWater, Immortal Technique – "The fucking Prophecy". https://genius.com/discussions/5537-Best-rap-lines-to-quote

4. Rap in schools

Rap for academic engagement. Music's perceived authenticity stimulates sociocultural and communicative competencies, and demands verbal dialogue to efficiently engage youth in educational commitment and learning (Engh, 2013). To encourage the educational benefits of popular music, the disconcerting effects of rap can be used to connect with its controversial and emancipatory impact. A genuine dialogue could invite individuals or communities to voice their diverse needs, allow them to engage more in school and build better relationships (Shochet et al., 2006). In order to progress towards a stronger engagement in science, in this case chemistry, one study used analogical teaching techniques in class and compared the bond of members of a rap group to thermosetting (Emdin, 2010).[42] Rap in the classroom can latch onto the roots of rap music as cultural empowerment (Christianakis, 2011) and may support current sexual health education programmes to progressively deconstruct sexual messages and misperceptions (Johnson-Baker, Markham, Baumler, Swain, & Emery, 2016). To affect well-being by offering dialogue and discussion between students and teachers and to learn about existing themes and boundaries such as literacy support and ideological and cultural challenges, rap may thus yield even more undiscovered potential (Christianakis, 2011).

Rap music's benefit and confusion. The values and substantive topics put forward in rap music, embedded in their traditional cultural backgrounds, should be seriously taken into account, even though our study has understated their impact.[43] Rap as a complex art form may be socially repulsive due to its tendency to use vulgar language and its glorification of violence, crime and sexist attitudes (Rebollo-Gil & Moras, 2012). Record companies often demand those mostly offensive lyrics for their own economic gains (Oware, 2011). However, many rappers are also expressing non-violent and authentic messages, as demonstrated by rap quotes expressing their personal beliefs, for instance to 'refuse to contribute to the gangster Illusion' (see quote in Chapter 2#). Rap styles currently dominate on streaming platforms and they controlled the charts in 2017. Those comercial styles of R&B/hiphop increased by 72%, and developed into the favourite popular genre among music fans, according to the Nielsen music report (2017-2018).[44] Rap, often described as coming straight from one's heart – the sensitivity to identify and define Rap As Poetry, to 'lyricize spontaneously about everything' (Perkins, 1996, p. 5) – does not undermine its own emotional, cultural and academic value and capacity. Skilfully designed, age-appropriate rap applications can be suited to bridge the need for more commitment, integrated learning and health in schools and therapy as well as to develop *vocal dialogues*.

[42] A thermosetting plastic is a polymer that irreversibly becomes rigid when heated.
[43] The historical, political and emancipatory connotations of rap music as a part of hip hop culture (Rose, 1994; Viega, 2013) were less present or of limited relevance in our investigation.
[44] Nielsen 2017 U.S. Music Year-End Report (2018)

Conclusion

This dissertation conducted a *R(h)apsody* of creative, emotional, cognitive and social self-expression by using vocalization of rapping and singing, similarly to the different brain regions working together as one orchestra. Music affects and effects both structures, the left and right sides of the brain, as our adolescents produced a *holistic* composition of emotional self-regulation developing into a symphony. This composition is not only important for the adolescents but might help society as a whole, by acknowledging the expansion of the understanding of music's potential within communities. Despite our limited results we encourage the application of music(therapy) integrated into daily school programmes, to stimulate and to assess the benefits of rhythm, rhyme, rap and singing for well-being in education and in therapy.

Appendix

Je wilt niet meer naar school
Je kunt er niet meer tegen
Buikpijn, angst...
Pesten maakt onzeker en je gaat er maar mee door
Pesten is stom en ook niet leuk meer
Pesten is vervelend
Het is veel leuker om samen te spelen
Stop met pesten!
Pesten is niet leuk Pesten doet iedereen pijn
Pesten is stom
Pesten is niet cool
Stop ermee, het doet pijn
Doe niet zo raar en daarmee is deze rap klaar![45]

[45] Groep-rap ontstaan tijdens de uitvoering van onze Rap&SingMT interventie in school.

Nederlandse Samenvatting

Een manier om welzijn en gezondheid van jongeren te bevorderen, te verbeteren of te herstellen is via het gebruik van muziek. Er is echter nauwelijks iets bekend over werkzame muziek(therapie) interventies op Nederlandse scholen ter bevordering van emotieregulering bij jongeren. In dit proefschrift wordt een onderzoek gepresenteerd met betrekking tot adolescenten en hun emotionele behoeften en de mogelijkheden ter verbetering van hun welzijn; voor dat doel werd een preventieve schoolinterventie ontwikkeld die gebruik maakt van rappen en zingen, wat naar verwachting weinig weerstand tegen deelname oproept. Rap & Sing Music Therapy (Rap&SingMT) kan jongeren een leeftijdsgerichte ondersteuning bieden bij de ontwikkeling van zelfregulerende vaardigheden. Dit is het eerste onderzoek waarbij een dergelijke motiverende muziektherapie-schoolinterventie voor groepen wordt toegepast en getest (Chapter 1).

In de muziek literatuur en ook uit diverse muziek-therapeutische praktijken (Chapter 2) is een grote verscheidenheid aan benaderingen met rappen en zingen bekend, waarbij de gemotiveerde participatie van jongeren en veranderingen in hun emotioneel engagement, cognitief functioneren en gevoel van eigenwaarde centraal staan. Voor de uitvoering van een Randomized Controlled Trial (RCT) betreffend een schoolinterventie voor muziektherapiegroepen, was het nodig het Rap&SingMT-protocol op te stellen met een uitwerking van de muziekconcepten, zoals de rol van ritme, vocalisatie en verbalisatie (Chapter 3), en van de assessments aangaande emotieregulering, executieve functies (EF) en slaap-monitoring (rust-activiteit-ritme).

Deze RCT toont de positieve effecten van Rap&SingMT met betrekking tot emotieregulering aan, met een *significante afname* van de totale probleemscore van SDQ en DERS in alle tests die door leerkrachten, ouders en deelnemers zijn afgenomen – dit tegen significant hogere probleemscores in de controlegroep; de Rap&SingMT-interventiegroep toonde een *beter en gestabiliseerd* resultaat in de periode tussen voor- en na-test (Chapter 4). Daarentegen tonen de uitwerkingen van Rap&SingMT ten aanzien van executieve functies, inhibitie, planning en werkgeheugen *geen significant* effect op de uitgevoerde taken. Daarnaast werd een kwalitatieve micro-evaluatie van video-opnamen van geselecteerde relevante *muziekmomenten uit* de Rap&SingMT-sessies uitgevoerd. In deze kleine selectie van muziekmomenten - muziek zonder gesproken woorden van gemiddeld 15 minuten per sessie – wordt vooral tijdens lichamelijke ritmische activiteit een groepsgewijze *flow-ervaring* waargenomen, waarbij de deelnemers op een coöperatieve manier *kortstondige executieve controle* tonen door middel van synchronisatie (Chapter 5).

Ook het monitoren van slaap (op basis van het rust-activiteit-ritme) met Actigraphy armbanden, laat *geen significante* verbeteringen zien bij de Rap&SingMT-groep; hun slaapvariaties verliepen volgens natuurlijke schommelingen voor de parameters slaaptijd en slaapefficiëntie. Weliswaar was de afname van de totale slaaptijd voor de duur van de experimentele periode van vier maanden in de Rap&SingMT-groep *minder* dan in de controlegroep, maar of deze effecten gerelateerd zijn aan onze interventie blijft onduidelijk (Chapter 6). De korte duur van de interventie en het relatief geringe aantal muziekmomenten vormen beperkingen van dit eerste onderzoek. Bovendien vertoonde onze deelnemersgroep 6% minder emotionele problemen dan het Nederlandse gemiddelde, hadden deelnemers normale scores op EF en gezonde slaapvariaties, waarmee weliswaar een stabilisatie maar nauwelijks een verbetering van het welzijn door Rap&SingMT te verwachten viel (Chapter 7).

Afsluitend kan worden geconcludeerd dat muziek(therapie) ter bevordering van emotieregulering in een breder perspectief moet worden geplaatst. Om dit bredere kader te onderzoeken zijn meer kwalitatieve *en* kwantitatieve assessments bij onderzoek naar jongeren nodig, met multidisciplinaire benaderingen in zowel klinische als niet-klinische settings. Om de multidisciplinaire inzet van muziek hierbij doelgerichter en longitudinaal te kunnen onderzoeken, zouden muziekprofessionals (docenten en therapeuten) routinematig gebruik moeten gaan maken van uniforme richtlijnen, gedefinieerde muziekcategorieën of specifieke protocollen voor individuen en (grote) groepen.

De belangrijkste bevindingen van dit proefschrift wijzen erop dat door middel van eenvoudig toepasbare muziek(therapeutische) interventies zoals ritme, rijm, rap en zang, afgestemd op de emotionele behoeften van adolescenten in dagelijkse schoolprogramma's, hun welzijn kon worden gestabiliseerd en misschien zelfs bevorderd. Dit potentieel verdient nader onderzoek.

Deutsche Zusammenfassung

Die vorliegende Dissertation untersucht die Auswirkungen der Rap & Sing Musiktherapie (Rap&SingMT) auf Jugendliche. Dieses altersgerechte Angebot dient der Unterstützung der Entwicklung von Selbstregulierungsfähigkeiten. Untersucht wurden in dieser Arbeit die emotionalen Bedürfnisse von Jugendlichen und die Möglichkeiten zur Verbesserung ihres Wohlbefindens. Der Einsatz von Rap und Gesang in einer präventiven Schulintervention ließ wenig Widerstand gegen die Teilnahme erwarten.

Musik kann das Wohlbefinden und die Gesundheit junger Menschen fördern, verbessern oder wiederherzustellen. Effektive Musik-(Therapie-) Maßnahmen zur Förderung der Emotionsregulation bei Jugendlichen sind an niederländischen Schulen bisher nicht bekannt. Die vorliegende Untersuchung mit der Rap&SingMT ist ein erster Forschungansatz, in dem eine so motivierende musiktherapeutische Schulintervention für Gruppen angewendet und getestet wurde (Chapter 1).

Aus der Musikliteratur und auch aus verschiedenen musiktherapeutischen Praktiken (Chapter 2) ist eine Vielzahl von Ansätzen mit Rap und Gesang bekannt, bei denen die motivierte Beteiligung junger Menschen und deren emotionales Engagement, ihre kognitive Funktion und ihr Selbstwertgefühl im Mittelpunkt stehen. Für die Durchführung einer randomisierten kontrollierten Studie (RCT) als schulische Intervention war es notwendig, das Rap&SingMT- Protokoll zu erarbeiten. Hierin wurden die Musikkonzepte, z.B. der Rolle von Rhythmus, Vokalisierung und Verbalisierung (Chapter 3) sowie die Überlegungen zu den angewandten Tests über Emotionsregulation, Exekutivfunktionen (EF) und Schlafüberwachung (Ruhe-Aktivitäts-Rhythmus) aufgenommen. Der RCT zeigt eindeutig positive Effekte von Rap&SingMT in Bezug auf die Emotionsregulation. Zu erkennen ist ein signifikanter Rückgang des Gesamtproblem-score von SDQ und DERS in allen von Lehrern, Eltern und Teilnehmern durchgeführten Tests gegenüber deutlich höheren Problem-scores in der Kontrollgruppe. Die Rap&SingMT-Interventionsgruppe zeigte ein besseres und stabilisiertes Ergebnis in der Zeit zwischen Pre-Test und Post-Test (Chapter 4). Im Gegensatz dazu zeigt die Rap&SingMT auf Exekutivfunktionen wie Reaktions-Hemmung (Inhibition), Planung und Arbeitsgedächtnis keinen signifikanten Einfluss. Darüber hinaus wurde eine qualitative Mikro-Evaluierung von Videoaufnahmen ausgewählter relevanter Musikmomente aus den Rap&SingMT-Sessions durchgeführt. In dieser kleinen Auswahl von Musikmomenten - Musik ohne gesprochene Worte von durchschnittlich 15 Minuten pro Sitzung - wird insbesondere bei körperlicher rhythmischer Aktivität ein Gruppen-flow-Erlebnis beobachtet, bei dem die Teilnehmer durch Synchronisation kooperativ engagiert zusammen wirken (Chapter 5). Auch die Überwachung des Schlafes (basierend auf dem Ruhe-Aktivitäts-Rhythmus) gemessen mit Actigraphie-Armbändern zeigt keine signifikanten Verbesserungen in der Rap&SingMT-Gruppe; ihre Schlafvariationen entsprachen den natürlichen Schwankungen dieser Altersgruppe für die Parameter Schlafzeit und Schlafeffizienz. Obwohl der Rückgang der Gesamtschlafzeit für die Dauer der viermonatigen Versuchsperiode in der Rap&SingMT-Gruppe geringer war als in der Kontrollgruppe, bleibt unklar, ob diese Effekte mit unserer Intervention zusammenhängen (Chapter 6). Die kurze Dauer der Intervention und die relativ geringe Anzahl von Musikmomenten sind Einschränkungen dieser ersten Studie. Darüber hinaus ist zu berücksichtigen, dass unsere Teilnehmergruppe 6% weniger emotionale Probleme hatte als der niederländische Durchschnitt; die Teilnehmer hatten normale Werte für EF und natürliche Schlafschwankungen, mit denen eine Stabilisierung, aber kaum eine Verbesserung des Wohlbefindens von Rap&SingMT zu erwarten war (Chapter 7).

Zusammenfassend lässt sich sagen, dass Musik (Therapie) zur Förderung der Emotionsregulation in eine breitere Perspektive gestellt werden sollte. Um diesen breiteren Rahmen zu untersuchen, sind mehr qualitative und quantitative Bewertungen für die Forschung an jungen Menschen erforderlich. Sie sollten mit multidisziplinären Ansätzen sowohl im klinischen als auch im nicht-klinischen Bereich stattfinden. Um die multidisziplinäre Nutzung von Musik gezielter und longitudinaler untersuchen zu können, sollten Musikprofis (Lehrer und Therapeuten) routinemäßig einheitliche Richtlinien, definierte Musikkategorien oder spezifische Protokolle für Einzelpersonen und (große) Gruppen verwenden.

Die wichtigsten Ergebnisse dieser Dissertation zeigen, dass durch leicht anwendbare musikalische (therapeutische) Interventionen wie Rhythmus, Reim, Rap und Gesang, zugeschnitten auf die emotionalen Bedürfnisse von Jugendlichen in schulischen Tagesprogrammen, ihr Wohlbefinden stabilisiert und vielleicht sogar verbessert werden kann. Dieses Potenzial bedarf weiterer Forschung.

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Personal thanks

Developing the subjects of this thesis into my personal *rhapsody* (literary: *an ecstatic expression of enthusiasm*), searching to voice my ideas, supported by steady rhythmic and grounding pattern for myself, I sometimes was completely *out of rhythm*. Parallel processes appeared, as usually during close personal and professional interactions, and similar to the solid personal struggles our adolescents experienced during their challenging developmental period - I also struggled during the nine years of my part-time research process. While conducting the concepts, and developing the Rap&SingMT method, subjects and training for music therapists to perform this school-based-group-intervention, my personal process was sometimes challenged and confronted, and strongly influenced my beliefs and wellbeing. Starting my PhD at Aalborg University in Denmark in 2010, during the first year I was confronted with the sudden death of my great professor for music therapy, **Prof. Tony Wigram**, with whom I had started to develop this study. Shocked and confused, I decided to leave this PhD program in Denmark, after the replacing supervisors disagreed about my research. Quitting, hesitating and/or searching - I found a new supervisor in Amsterdam - the city I was living in. **Prof. Erik Scherder**, head of the department of clinical neuropsychology at Vrije Universiteit Amsterdam (VU), invited me to develop new music-research-ideas under his enthusiastic guidance in 2012. I felt treated like a daughter - he passionately supported my passage as the most trustworthy professional I ever had experienced - like a real *professor-father*, as such a supervisor is called in German language. After years of his dedicated guidance, just finishing the analysis of my Rap&SingMT, in 2015, I was diagnosed with palliative cancer of a rare kind of spinal sarcoma with an average survival of 30 months[46]. Due to my illness, I left my responsibilities as a Lecturer of Music Therapy and Research Coordinator of the Creative Arts Therapies program at HAN University of Applied Sciences in Nijmegen (HAN), and deprived of the former stress I focused on finishing my PhD research. I would not have survived *this* challenge without the interactions of the community of gifted colleagues and students from both departments of VU Amsterdam and HAN University Nijmegen – a scattered but passionate support and professional supervision:

Without the brilliant skills of **Erik Scherder** - this all would not have been possible. Words fail me, Erik: Thank you for taking the trouble to help me. Your knowledge, professionally and fatherly support, passion, enthusiasm, humor and jokes are incomparable - you kept me going over and over again between periodes of medical treaments and study!

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While writing up the final pieces of my dissertation, I am very thankful for all the support and specialist medical care, I received during the 3 years of my diagnose. I also identify the sensible impact of practices of yoga, meditation, music and singing for wellbeing as holistic support for my healing process. Finally, and parallel to my dissertation, by the use of multidisciplinary approaches, I placed my health, healing and my education in broader perspectives. Therefore, both my personal and professional thanks go to the entire community of gifted people, doctors, nurses, professors, therapists, teachers, colleagues, students and friends, who assisted me during this tough as well as enriched time. I received the ultimate support for my physical, emotional, cognitive and spiritual wellbeing, as well as unconditional love from my partner and my family to recover the rhythm of my *life*.

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Curriculum Vitae

Sylka Uhlig was born in former East Germany (1961), and graduated in 1978 from an integrated comprehensive school. She studied classical music at Robert-Schumann-Conservatorium Zwickau, singing at Hans Eisler Conservatorium Berlin/Schwerin, and continued her musical education in the Gewandhaus- and Bach-Chamber-Choir in Leipzig[47]. In 1988 she moved to the Netherlands, and completed in 1993 her Bachelor in Music Therapy at the HAN University Nijmegen. Until 1999 she developed music therapy programs in psychiatric settings of Den Dolder and Zeist (NL), and conducted individual and group work for traumatized and forensic rehabilitation clients (short/long–term treatments). She received additional training in oriental music therapy (Turkey), as well as in several voice & body work approaches (NL, USA). In 2000 she completed her Advanced MA in Music Therapy at New York University (USA), and worked in neurological settings with patients with trauma, strokes, Parkinson disease and Alzheimer. Until 2005 she was engaged in programs of the Board of Education of New York City (USA), working with autistic, emotional and developmentally delayed children. In 2005 she returned to the Netherlands, to teach music therapy, voice and research at HAN. Since 2010 she developed her PhD study (AAU Denmark/VU University Amsterdam, NL). During 25 years of music therapy practice in psychiatry, rehabilitation, special education, private practice as well as experiences in research and teaching, she established specific *voice/rap/singing* approaches, and created articles and books about voicework in music therapy. As presenter of voice workshops and trainings at international conferences, private institutions, and founder of *Voice Forum*, she emancipates the voice as primary instrument in music therapy.

[47] Both conducted by G. C. Biller, in company with Kurt Masur.

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Uhlig, S., Groot, J., Jansen, E., & Scherder, E. (2019). Rap & sing music therapy and sleep in adolescents: A single-blind cluster randomized controlled trial. *Nordic Journal of Music Therapy, 28,* 60-70. doi:10.1080/08098131.2018.1542613.

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Uhlig, S. (1996) Èen symposium, dat bruggen slug. In *Tijdschrift voor Kreative Therapie*, NL (article about old-oriental music therapy of Dr. R. Oruc Güvenc, Turkey).

Presentations & Workshops

2019/2017/2015/2014 Training and Workshops: Experience of Singing & Transfer for Professional Development; Rap Music Therapy Training, Center for Education (Agenzia di educazione permanente), Bolzano, Italy
2018 Workshop Stem & Zingen: Studiedag Creative Therapie, Artevelde Hogeschool, Gent, België
2018 Workshop Stem: Miracles of Music, Dag van de Muziektherapie, VU Amsterdam, Netherlands
2018 Workshop & Presentation: Experience of Singing & Transfer for Professional Development at Voice Training Program in Music Therapy: IL CANTO DELLA VOCE, Trento, Italy
2017 Presentatie & Workshop: Rap & Sing Music Therapy – RCT - Emotie regulatie jongeren - resultaten en inzichten: Netwerkdag muziektherapie; F.P.C. de Rooyse Wissel Venray, Netherlands
2017 Presentatie resultaten PhD studie Rap & Sing Music Therapy (RCT); FVB-Strategische Onderzoeksagenda voor de Vaktherapeutische Beroepen, HU Amersfoort, Netherlands
2017 Presentations at World Conference of Music Therapy, Tsukuba, Japan
2017/2015 Presentation & Workshops, Internationale Jahreskonferenz von Singenden Krankenhäuser, Hannover & Köln, Germany
2015 Presentation & Workshop Ecarte Conference Cultural Landscapes in Arts Therapies: participation, diversity and dialogue. European Consortium for Arts Therapies Education, Palermo, Italy.
2015/2014/2010/2006 Presentation & Workshops University of Ljubljana, Department of Pedagogic &Psychology, Slovenia
2014 Workshop & Presentation World Conference of Music Therapy, Krems, Austria
2014 Workshop International Conference Anthroposophical Music therapy, Zuthphen, Netherlands
2014/2013 Rap Muziek Therapie Training (cooperation Benjamin Hoeltje), HAN Netherlands
2013 Presentation ICME3 Music & Emotions, Conference University of Jyväskylä; Finland
2012 Workshop Hogeschool Leiden, Kunstzinnige Therapie Opleiding; Netherlands
2012 Presentation Symposium Kinder- und Jugendlichenmusiktherapie Norddeutschland, Schwerin, Germany
2012 Presentation Studiedag STEM: Nederlandse Vereniging voor Muziektherapeuten, Netherlands

2012 Presentation Hip Hop Therapy & Hip Hop Psychology Conference (presenter Benjamin Hoeltje) Fordham University New York, USA
2011/2009 Workshop & Presentation Voice Scope Prague, training private institution, Czech Republic
2011 Voice Workshops World Conference of Music Therapy, Seoul, South Korea
2011/2008 Presentation & Workshops GNOON: studiedag voor vaktherapeuten, Netherlands
2010 Training Rap-Musik-Therapie (cooperation Benjamin Hoeltje); LVR-Klinik Bedburg-Hau, Germany
2010 Workshop European Conference of Music Therapy, Cadiz, Spain
2009 Workshop Nordoff/Robbins Musik Therapie Verein, Witten, Germany
2009 Workshop Nordic Music Therapy Conference (cooperation Sanne Storm & Inge Nygaard Pedersen) Aalborg, Denmark
2008 Workshop Muziek & Handicap: studiedag stem; Belgium
2008 Workshop & Presentation World Conference of Music Therapy (cooperation Kate Geller) Buenos Aires, Argentina
2007 Workshop European Conference of Music Therapy (cooperation Kate Geller), Eindhoven, NL
2007 Workshop ECArTE: European Creative Arts Education Conference, Tallinn, Estonia
2005 Workshop Beth Abraham Health Services, Institute for Music and Neurologic Function, NYC, USA

Conferences at American Music Therapy Association (cooperation with Kate Geller, USA)

Workshop Singing: A Personal and Professional Need
2005 Garden City, NY
2003 Bethesda, MD
2002 Saratoga Springs, NY
2001 Williamsburg, VA
A Time To Sing, voice workshops (cooperation with Kate Geller):
2001-2005 weekly voicework workshops for music therapy students & others, NYC, USA
2001 New York University, department for music therapy, NYC, USA
2001 Directions in Music Therapy, Sound Health Studio, NYC, USA